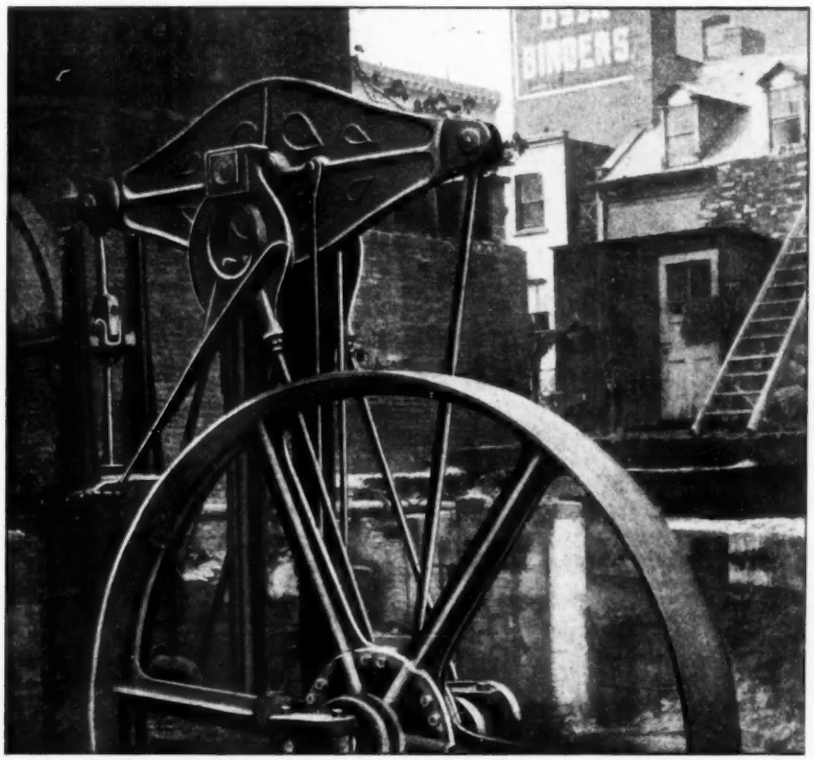
AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

VOLUME 20. NEW YORK, THURSDAY, NOVEMBER 25, 1897. NUMBER 47.

A Venerable Corliss Engine.

As a slight contribution to the history of the steam engine, we reproduce here a photograph taken a few days ago. The engine shown is one of the early Corliss engines. It was built August, 1853, for the New York Crystal Palace, and remained there until the building was destroyed by fire. In August, 1856, it was set up in the place here shown, and has been running constantly up to a few weeks ago. It belonged to the Hall Steam and Power Company, and furnished power to a number of tenants. The progress of improvement requiring the demolition of the building, the engine now goes to the Agnew Milling Co., Titusville, N. J., where its useful life is expected to continue indefinitely. The original cylinder of this engine was 14 x 60 inches. After the Crystal Palace fire the engine received a new cylinder 20 x 60 inches, with the improved valve gear which had in the meantime been developed. The engine is said to be still a very good one, as stationary engines go. While this is not the first Corliss engine, it is still old enough, and was once prominent enough to be worth keeping trace of. The immediate predecessor of this engine, and the first one from the patterns, we are informed by the Corliss Steam Engine Company, is still running their works.



A VENERABLE CORLISS ENGINE.

Engineers Beg for Light.

"The importance of proper illumination of the machinery compartments is not fully realized, except by those whose duty requires them to be there constantly. Inspections by other officers are invariably made when the electric lights are burning brightly, the dynamos being started specially for the purpose in many cases. General Orders 471 and 473 undoubtedly contemplate that adequate light should be provided, but the whole matter is in the discretion of the commanding officers, and experience has shown that, with a view to pleasing the Department by economy, they usually shut down the dynamos in port, except for a few hours in the evening and in the morning watch, unless the lights are specially requested for important work. It does not seem to be realized that, in modern ships with a protective deck, and even the hatch openings filled with armor bars, there is no such thing as natural illumination; it must all be artificial. To give adequate light by means of oil lamps would involve an expense for oil alone much greater than the additional coal used for running the dynamos with engines of fair economy.

"With respect to the lighting of the ship generally, this Bureau is not concerned, but it has a vital interest in that of the machinery compartment, and is satisfied that it can only be done properly by electric lights, which should be in use all the time. In order that this may be secured without involving other parts of the ship, the Bureau recommends that it be granted authority to install, within the machinery space, an electric plant for the lighting of the engine and fire rooms, to be entirely under the charge of the chief engineer, and to be run continuously. The cost would not be great, as the plant would be small, and it would need no additional men to run it, as there are men of the engineer's force constantly on watch with the other auxiliary machinery.

"When it was proposed, more than eight years ago, to carry out this plan on the Maine, it was at first approved, but afterwards disapproved on the ground that it was useless to have two electric plants, as the one provided would always be in use. This was the case for a time. As it is so no longer, the necessity for a special plant for the machinery compartments has again arisen. As it would contribute materially to the efficiency and safety of the machinery, as well as to the discipline of the department, the Bureau trusts that its recommendation will be approved by the Department."—Report of Commodore Melville.

Technical Education.

BY A. L. BOWEN.

It seems to be generally conceded that technical education has become an important factor in an engineer's equipment, at the same time, there appears to be a disposition to criticise our technical schools rather harshly, and this criticism comes not only from those who have come up by their own efforts, but from those who have graduated. These critics say that a young man puts in four years at a university and when he comes out he isn't a machinst, he isn't a pattern maker, nor a draftsman, nor an engineer, which amounts to saying he isn't anything, and while they admit that his time has not been entirely wasted, the assertion is usually made that he has a good deal to unlearn before he is of much "practical" —(how I despise that word)—value. They do not seem to remember that no one ever became a very accomplished anything in four years. Who ever knew a boy to become a first-class machinist, or molder, or pattern maker, in that length of time? I have known a few who made great progress in their work and whose services were of undoubted value; but that they had become mechanics in that time, never, and I am speaking of those who have put their energies into only one branch of the business. The surprising thing is not that the technical graduate does not know more, but that he knows as much as he does. He is hustled around through the foundry, machine shop, etc., stuffed with mathematics, chemistry, French, German, history and metaphysics. Of course, he hasn't all of this stuff assimilated on commencement day; it is absurd to expect it. But he has, if he has made an honest effort to use his opportunities, got some idea of what engineering is. He has found out most likely that running a transit is not civil engineering, and that running a lathe isn't constructing a 50-ton locomotive crane; he may have a suspicion that a man might be able to do any one of these things, and not be able to do any of the rest, and this is not an unimportant thing either, simple as it may seem. The engineering school is hardly out of its baby days yet, though it is getting so it can talk quite a bit, so to speak. Engineering as a science is in its infancy—a pretty lusty infant to be sure, but it is awfully young. People—the masses—have no idea what engineering means. They don't know that it requires just as fine an intellect to be a civil or mechanical engineer, as it does to be a lawyer or doctor. No one who is on the outside has any idea of the breadth or scope of a technical course in our best schools, nor the severity of the mental discipline. Engineering literature, while perhaps large by itself, is comparatively meager. Go into a book store like McClurg's, for instance, where you can find almost anything from "The Life of Jesse James" to "Shakespeare," and see what a small space is occupied by technical books, and yet you can find there almost anything in books that you call for. The time is here now when the successful engineer must have a technical education. He may not get it at a university, but he must get it—call it what you please. I admit that in some cases energy is misdirected at school. I do think that putting in six weeks on gearing and explaining Willis' odontograph is time partly thrown away. The designing and building of an engine lathe, a drill press or milling machine that nobody wants when it is done is of no very great value as an object lesson—unless it shows that it should not be repeated. Building tools of that character isn't engineering in any sense of the word, for the reason that tool building is mostly a matter of rule of thumb. Judging by the catalogs it consists principally in making all the bearings "unusually long and heavy" and the gears cut from solid stock. The most value to the student comes in the practice in delineating the various parts, and acquiring facility in the use of instruments. It doesn't impress upon his mind that most machinery cannot, even by experienced men, be built by rule of thumb. That it will not do to look at your neighbor's product and then make the corresponding features unusually long and heavy. It doesn't impress upon him that engineering is a science, and that guesswork must be eliminated just as far as possible. Certainly in all mechanical contrivances something must be assumed at the start, and while the assumed conditions may be wrong, bad judgment may have been used, the student must learn to proportion the various parts of his machine from the data which have been given, and this can be done only by carefully considering the relation that each individual part sustains to each other part individually and collectively, and then proportioning the same according to well established practice—and that so far as the proportions are concerned nothing must be guessed at. Take, for instance, a steam shovel. It might be assumed that the maximum pull on the end of the boom would be 20 tons. That assumption being made fixes the conditions that everything else must meet, so far as the hoisting apparatus is concerned. No man can guess how large an engine should be used. No one can tell simply by looking at the general design how heavy the rolled shapes for any specified parts must be, or whether the hoisting chain should be one size or another. Someone may know that a certain piece is not strong enough—and he did not find it out by guessing either—or that another part had never failed and is therefore strong enough. That is "judgment." But unless he has carefully analyzed the conditions and calculated the stresses, he does not know how much heavier the one should be, nor does he know whether the other which has not failed is just sufficient, or is unnecessarily strong. In my own schooling, I know this principle which runs through all designing of any magnitude was not sufficiently dwelt upon. That in some instances the same fault exists now, I am sure of, by the output. The designing of a five-ton, three-motor electric crane would give a class of students a chance to apply their strength of materials and their analytical mechanics in a way that would make an impression, it seems to me. I have sometimes thought it would be a good thing if they were taught to apply formulas for the strength of beams, etc., early in the course, long before they had learned to originate them. Then when they came to the subject of strength of materials they could see the real value of it. I believe also that such hand-books as are given out by Carnegie and the Pencoyd Iron Works should be used as a text book for a few weeks some time during the course, for the reason that the products of these companies are used so extensively that a knowledge of their properties is almost indispensable. I am aware that our text books treat on this subject fully and exhaustively, but they do not have the matter boiled down to the point where it can be readily used in the office, and they are therefore nearly useless, so far as the drafting room is concerned. The student should learn to use standard tables, such as the horse-power of shafting, sizes and threads of standard bolts and nuts, weights of plates, bars, etc. The bending moments of a cantilever and of a beam supported at both ends and loaded uniformly, or concentrated at the end, or at the center, together with the moment of inertia of a rectangular section should be as familiar as the multiplication table. He should know what presssure per square inch of projected area is allowable for journal bearings under certain conditions, or at least be able to refer readily to some acknowledged authority. Good judgment is the result of experience and accurate observation. Observation without experience is impossible; experience without observation is painfully common and furnishes us with a vast amount of very poor judgment. The young man fresh from the university has had no experience to speak of, and it follows necessarily that his off-hand opinion on mechanical matters will be of little value. He secures a position in the drafting room of some concern having perhaps quite a reputation, and he looks upon his chief as a man of great attainments. He hears him tell one man that a certain part is too large, and that another is too small and so on, and he naturally imagines that his chief has discovered a short cut, has acquired some way of knowing intuitively what correct proportions are, and being anxious to turn out as much work as possible, he uses his intuition

with the result that he probably has his work to do over again. He is mistaken; there is no short cut. Unimportant details may be determined off-hand, but if there is anything at stake the straight and narrow way must be followed to the end. The student should learn, too, that a drawing, like nearly everything else, is simply a means to an end; if it accomplishes that end it is a success, if it does not, it is a failure. He should know that most pattern makers and machinists know nothing of the planes of projection and care less. That most of them never heard of the first or third angle, or, if they did, they didn't know what it was and didn't want to learn. They want a drawing that looks like the thing to be made, and if there is a side elevation and two end views, they expect the end view at the right is the right-hand end, and so of the left, for the same reason. I suppose that a man would go into the street to see the front of a house, rather than to the alley, strange as it may seem. They expect the dimensions to be legible and in shape to be used without adding up a lot of vulgar fractions. If a draftsman wants to get some idea of how a drawing wants to be "figured," let him attempt to copy another's drawing and use only the information given on that sheet, including the injunction "Do not scale." It might be a revelation to some. It takes time to learn all of these things, more than four years, more than a life-time for some. As to mathematics, I do not think that subject is overdone in our schools, even though a large percentage "flunk" in their examinations. One reason the percentage is so large is because the indispensability of mathematics in every-day work has not been demonstrated. And to one who finds conic sections and calculus exceedingly uphill work, seeing no chance to apply them in practice, it is very easy to get the notion that they are of no real value; that practical men do not use such things, and then the effort is not made that should be to master them. The number in any class who would fail to acquire a fair knowledge of all mathematics taught in an ordinary engineering course is very few if the necessity for having that knowledge was made fully apparent, and the subject was properly presented. But no student in his freshman year will take anyone's word for that, nor will he believe it until he sees for himself. I do not agree with those who say the study of mathematics has a tendency to make men "mere theorists." Practical men, so-called, who are not mathematicians, are given to making that criticism, but I have noticed they use what mathematics they have, even if it is only the "rule of three." Mathematics, pure and applied, teaches one correct principles; it teaches sound reasoning, and the relation of cause and effect; it explains fully what is meant by exactness. It teaches that nothing is absolutely flat, nor straight, nor square, nor round. Unfortunately, it doesn't teach us how closely these may be approximated. The result is that the inexperienced man who is "full of theory" may assume impossible conditions. With the same work to do and with different experience of the same extent, he would most likely assume just as impossible conditions, but in another direction.

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Mitis Founding.

FURNACE CONSTRUCTION.

Although several years have elapsed since the discovery of a successful process of making castings from wrought iron, this industry has not received the attention from manufacturers that might reasonably have been expected, considering the many advantages it possesses over steel and malleable iron for the production of certain classes of castings.

One of its advantages is the superior strength of the castings; another and more important one lies in the facility with which they can be obtained, as it is not necessary to dry the molds or anneal the castings. The work can be turned out as easily as in the case of gray iron or bronze.

Probably one reason of the neglect above mentioned lies in the dearth of literature on the subject, very little reliable information having been published.

In the following remarks the writer will endeavor to give a general idea of the process up to date. The furnace most generally used is known as the Nobel oil furnace, which was invented especially for this industry, and seems so far to have been more successful than any other kind of furnace in producing the excessively high temperature demanded. Some idea may be formed of the degree of heat necessary when it is considered that the charge often consists of the finest wrought iron obtainable, and must be thoroughly liquefied. The idea that aluminum is added, when the charge is in a pasty condition, and immediately causes liquefaction, is erroneous. The metal must be brought to a certain temperature, then any substance that will eliminate blow holes is added, the introduction of which always chills the metal, which is kept in the furnace a few minutes to regain its temperature, then quickly removed and poured. The proper temperature of the metal is determined by the insertion into the charge of a quarter-inch iron rod; if the rod comes out covered only with slag the metal is ready, but if any metal adheres to the rod the metal is too cold. However, mistakes will sometimes occur. The writer has known charges a little too low in temperature to receive an aluminum mixture be removed from the furnace, and when poured, behave just the same as other charges not mixed with aluminum that had been taken out too cold, namely,

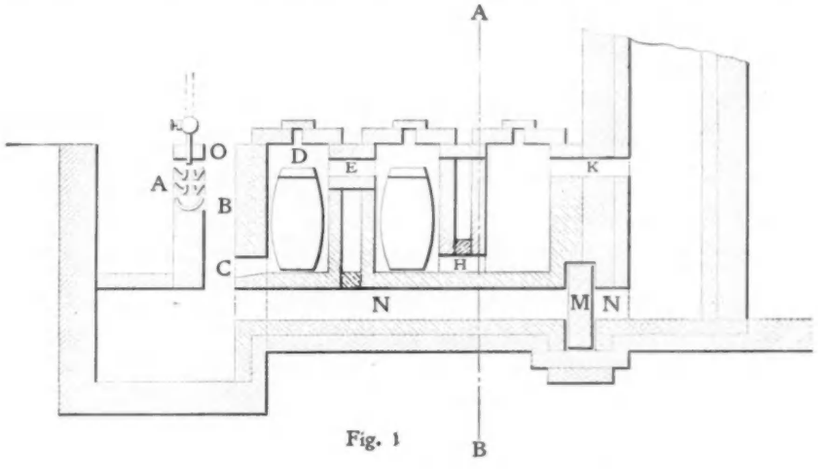
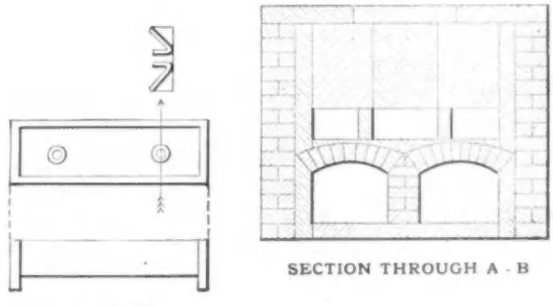


Fig. 1



OIL PANS

SECTION THROUGH A - B

Fig. 2

American Machinist

THE NOBEL FURNACE.

solidify in the crucible. These accidents entirely disposed of the theory, advanced by some writers, that the addition of aluminum to wrought iron causes a lowering of from 300 to 500 degrees in the melting point, that is, as far as the writer is concerned. Fig. 1 shows a longitudinal section of the furnace, as originally designed according to the specifications in the United States Patent Office (patent 321,840).

In practice, however, this form is departed from somewhat, as shown by Fig. 3. It will be noticed that the flue immediately beneath the first or melting chamber is deepened into a vault. This permits

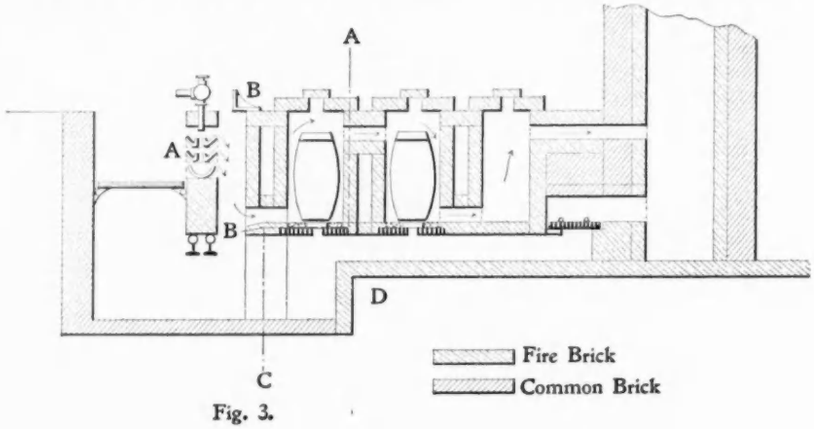
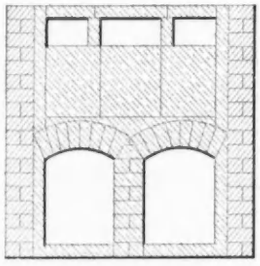


Fig. 3.



SECTION THROUGH A - B - C Fig. 3.

Fig. 4. *American Machinist*

THE FURNACE AS MODIFIED.

the withdrawal of the metal in case a pot breaks. With the old form the furnace has often to be torn down. The pans in which the oil is burned are shown at *A*, Fig. 1 and in Fig. 2. The oil (crude) flows from an overhead tank through suitable piping into the first or top pan. Each pan has two projections or "tits" arising from the center, as shown in Fig. 2, which are about a half inch lower than the sides of the pan. When the oil rises to the top of these projections it flows through the hole in the center into the pan beneath.

Each furnace is provided with six pans, which are arranged end to end in two groups of three each, being held in place by a suitable frame of cast iron. The two bottom pans have no projections in the center. The flow of oil is so regulated as to just keep each pan full. The flame impinges on the brick wall *B*, Fig. 1, passes through the port *C* through the melting chamber *D* up to the port *E*, down through the heating chamber to the third port *H*, through the third chamber and port *K* to the stack. It will be noticed that there are three chambers. In the first melting is done. In the second the crucibles and charge are heated.

When the first pots are melted and withdrawn, the pots from the second chamber are moved into the first and the second chamber is charged with cold pots. The third chamber, although necessary, is not used, the heat therein going to waste. The writer has utilized it, however, for melting brass. (Shops making such castings will find it an economy to combine the business of brass founding, thereby utilizing the heat wasted in the third chamber. In such a case, however, provision must be made for charging the brass into the crucibles without entirely removing the cover from the third hole; otherwise the efficiency of the first steel melting hole will be impaired. This can be accomplished by making the cover in sections.)

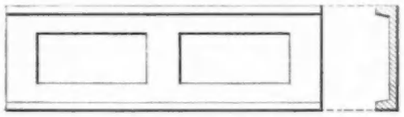
When the pots are ready to be pulled out, the damper *M* is withdrawn by means of a suitable lever. The flame then passes direct through the flue *N* to the stack, thus saving the workmen.

Air is admitted between the pans, also through the opening *O*. The amount of air passing down *O* is regulated by a suitable cover of cast iron, as shown at *B* Fig. 3. When the furnace is heated and properly working, no smoke should be visible from the stack. The walls or bridges dividing the chambers are made hollow, in order that the air may circulate, thereby cooling and preserving the brickwork. Two firms with which the writer is acquainted tried the experiment of making their furnaces large enough to accommodate three crucibles abreast. The idea was not a good one, however, for the furnaces had to be changed back to two-pot holes, as it was found that the pot in the center got more heat than the others, consequently it was ready for withdrawal before the rest; and as this was difficult to accomplish it had to be held until the others were ready, so that much loss was experienced from this pot breaking, as it was so softened by the prolonged heat that it generally collapsed when gripped by the tongs. When building these furnaces the first thing to claim attention is the excavation. This should be of such a size as to allow plenty of room for the masons to make a nice job of the outside walls. The dimensions of the furnace can easily be figured out by taking an ordinary steel-melting crucible as the unit of measurement. The melting chambers should be of such a depth that when the crucible with cover on is placed on the bare bottom of the chamber, the top of the cover shall come about six inches below the top of the furnace. This will allow of two inches of coke dust being put in the bottom of the chambers (precisely the same as in the Siemens furnace), which prevents the crucible sticking to the bottom. The bottoms of the first and second chambers are formed of a cast iron plate one inch in thickness and of suitable length and breadth. Underneath where the crucibles will stand a three-inch hole is cast in the plate. When the furnace is working this hole is covered with the bottom of an old crucible. Over this the coke dust is levelled. In case a pot breaks this cover is broken with an iron bar, and the metal finds its way into the vaults beneath, to be extracted when cold.

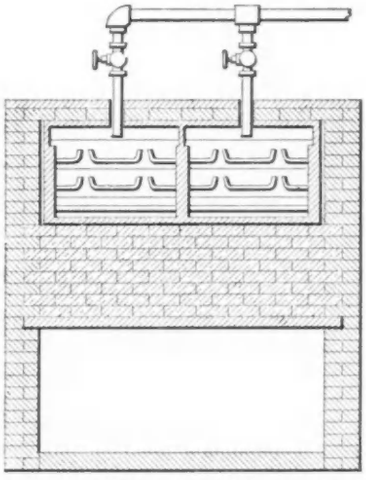
Beneath the chambers is the flue through which the flame is drawn while withdrawing the pots. The flue should be at least twelve inches in hight, and as wide as the furnace. It is divided longitudinally in the center by a fire-brick wall, so that there are really two parallel flues. This wall supports the upper part of the furnace in the center. The vault is an enlargement of the flue, and should go from twelve to eighteen inches deeper than the other part of flue, to accommodate which this pit will have to be made so much deeper at this point. The breadth and width of the chambers are determined also by the size of the crucibles to be used. When standing in the chamber there must be about three inches of space between and around them. This will allow plenty of room for the tongs in pulling out.

After the dimensions have been figured out and the excavation made, the next thing is to lay the floor, which will form

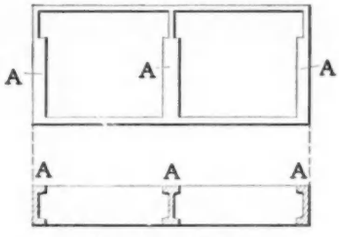
the bottom of the flue. Any kind of old fire-brick will answer for this, provided they are set level. The insterstices should be filled in with a mixture of fire clay and sharp sand. The step caused by the enlargement of the flue, to form the vault, will necessitate the erection of a fire-brick wall at this point, as shown in *D* Fig. 3. The outside and the longitudinal supporting walls are built of good fire-brick and carried up to the hight the flue is designed to have. The whole is now arched over with the exception of the first and second at the top, as shown in section Figs. 3 and 4. They should be six inches in hight, and of the entire width of the furnace. The two dividing bricks are for the purpose of supporting the brickwork above them. The construction of the bridges is clearly shown by the drawings. They are built of oven tiles four inches in thickness. The width of the bridges is twelve inches, this allows of an air space of four inches in the center, as shown. Nothing but the most refractory materials must be used in the construction of the bridges, as they are subjected to the most intense heat. Fig. 6 makes clear the arrangement of the pans, and the method of conducting the oil thereto, Fig. 7, shows the frame for holding the pans in place, which is bricked in with the side walls. The retaining slides



DAMPER SLIDE
Fig. 5.



CROSS SECTION THROUGH OIL PANS
Fig. 6.



CAST IRON FRAME
FOR HOLDING OIL PANS
Fig. 7.

American Machinist

ond chambers, whose bottoms are formed of the cast iron plates before mentioned.

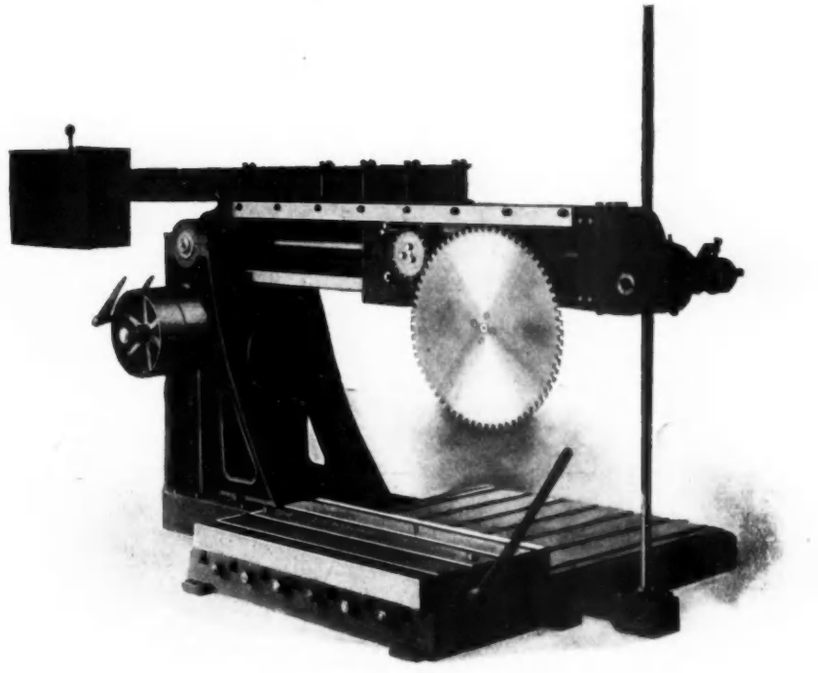
It will be noticed that the damper in Fig. 3 is placed horizontally, instead of vertically, as in Fig. 1. This makes it easier to manipulate. A cast iron frame Fig. 5 is placed across the walls at this point, upon which the damper rests, being held down by its own weight. The side walls are now carried up and completed, after which the bridges are built in. Each bridge has three portholes or flues. In the first bridge these are at the bottom, in or ribs, *AA*, are cut away a short distance from the top to provide for the insertion and removal of the pans. The furnace covers are formed of oven tiles, stoutly banded on the outside, and provided with handles. They are manipulated by means of a suitable lever, traveling on a telegraph. In order that the progress of the metal can be observed, each cover is provided with two holes three inches in diameter. When the covers are in position the holes are directly over the crucibles. The hight of the chimney should be from 60 to 80 feet, according to location. It may be built of either brick or boiler iron. When iron is used, the stack must be lined with fire-brick for a hight of 30 feet. A boiler iron stack 60 feet high, 3 feet 6 inches in diameter, will give draught enough to run three furnaces.

K. K.

Metal Sawing Machine.

We present herewith engraving of a noteworthy machine tool which has been designed especially for the purpose of removing shrink heads, burrs, gates, etc., from large castings, especially steel castings.

The machine, as an inspection of our illustration will show, consists essentially of a bed plate to which is attached, at the rear, a double standard, at the top of which is pivoted an arm arranged to swing up and down for the feed motion. To this arm is attached a saddle carrying the saw arbor. The saw is driven by bevel gearing and finally by a pinion which engages directly with the teeth of the saw, motion being transmitted by means of the splined shaft seen within the arm. The arm is counterbalanced as shown, and the feed



METAL SAWING MACHINE.

motion is obtained by a stationary screw which is pivoted at its lower end as shown, and the nut is revolved for the feed, mechanism being provided for automatically doing this. Means are provided for changes of rate of feed from a minimum of ⅛ inch per minute to 1 inch per minute, which changes can be made without stopping the machine or the feed motion. The hight from the floor to the axis of the arm is 5 feet 6 inches, and the travel of the saw upon the arm is 4 feet. The diameter of the saw used is 36 inches, and it will be noted that there are no projections on one side of it, so that it can be used in places which it would otherwise be impossible to reach. The lower table is 5½ x 6½ feet, and the adjustable table, which is moved by means of the rack and pinion shown and can be clamped in any desired position, is 2½ x 5½ feet.

The saw arbor is 2 15-16 inches diameter.

At the completion of a cut an adjustable automatic stop throws out the feed and raises the arm with a quick return motion The machine is designed for heavy work, and in the works of one of the large manufacturers of steel castings cut through 15 inches of such a casting in 28 minutes. Owing to the narrowness of the cut made, comparatively little power is required for driving, and the machine can be driven by a small electric motor if desired. The machine weighs 18,000 pounds, occupies a floor space 7 x 11 feet, and is made by the Q. & C. Co., Chicago, Ills.

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An Adjustable Ring Oiling Quarter Box Bearing.

The cuts on this page show the adjustable bearing now used on the pressure blowers built by the Connersville Blower Company, Connersville, Indiana. An adjustable bearing is a necessity upon a blower of this type, as the impellers and revolving parts must be kept in their proper relation to each other, and to the case in which they revolve. As some of these bearings are made as large as 7 inches diameter and 21 inches long, they have all the importance of steam-engine bearings.

Fig. 1 is a vertical section of the journal and bearing complete; Fig. 2 is a central cross section, and Fig. 3 is an end or outside elevation. The lower quarter box *B* has a large oil receptacle cast as a part of it, which holds the entire stock of oil for

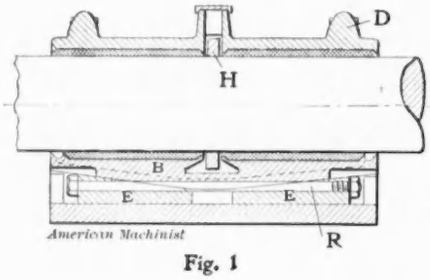


Fig. 1

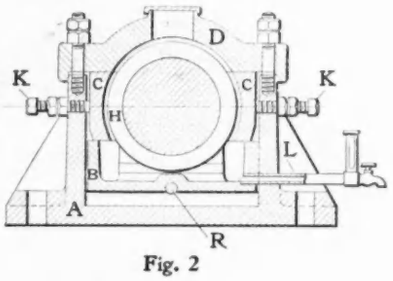


Fig. 2

RING OILING BEARING.

the bearing. A pipe *L*, tapped into the side of the box and passing freely through the frame, has a vertical glass tube outside always showing the hight of the oil, and a cock by which the oil may be drawn off when desirable to renew it. This quarter box *B* is supported upon two wide wedges *E E*, which are set up simultaneously by being drawn together by the bolt *R*. If there is more pressure upon one wedge than upon the other, the wedge having the least pressure will naturally advance rather than the other one, until the pressures are equalized. The side quarter boxes *C C* are supported upon the projecting sides of the bottom box *B*, and the top box, which is also the cap, is tightened down solidly upon the whole. This cap does not bear upon the frame *A*, but upon the side boxes *C C*, thin packing strips or liners being used on the entire upper surfaces of *C C* to give the precise required vertical adjustment for the upper quarter *D*. Boxes *C C* are, of course, adjusted horizontally by screws *K K*. A ring *H* rides loosely upon the journal in the center of the bearing; cavities sufficiently large are provided in the boxes to allow the ring perfect freedom. The lower part of the ring runs constantly in the oil, and conveys it to the top of the journal, whence it is diffused over the entire bearing. What oil works out at the ends of the bearing is caught by the gutter at the end, and returned to the oil pocket below. The boxes are lined with the best grade of babbitt poured into the several sections, hammered all over, then bored out and scraped to a surface. The box is filled by removing the cap in the center of the top and pouring in a sufficient quantity, the ring fitting the cavities so loosely as to allow it to flow down freely.

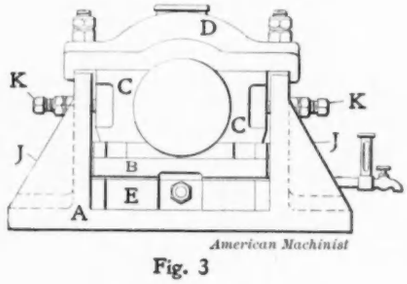


Fig. 3

END OF BEARING.

▲ ▲ ▲

Awards at the Brussels Exposition.

An exhibitor at Brussels sends us the following statement regarding prizes awarded on machine tools:

1st—The "Grand Prix," or highest possible distinction, was awarded to but three concerns, one foreign and two American: Brown & Sharpe Manufacturing Company, Providence, R. I.; The Pratt & Whitney Company, Hartford, Conn.; Le Progres Industriel, Brussels, Belgium.

2d—The gold medal, or next to the highest distinction, was awarded to eight foreign and nine American competitors: Cincinnati Milling Machine Company, Cincinnati, O.; Gould & Eberhardt, Newark, N. J.; G. A. Gray Company, Cincinnati, O.; J. Becker Manufacturing Company, Fitchburg, Mass.; Morse Twist Drill & Machine Company, New Bedford, Mass.; Norton Emery Wheel Company, Worcester, Mass.; Prentice Bros., Worcester, Mass.; Bullard Machine Tool Company, Bridgeport, Conn.; Warner & Swasey, Cleveland, O.

3d—The silver medal was awarded to eight foreign and nine American competitors: Acme Machinery Company, Cleveland, O.; W. F. & J. Barnes, Rockford, Ill.; Bickford Drill & Tool Company, Cincinnati, O.; Bradford Mill Company, Cincinnati, O.; Gisholt Machine Company, Madison, Wis.; Landis Bros., Waynesboro, Pa.; F. E. Reed Company, Worcester, Mass.; Bradley Company, Syracuse, N. Y.; Hendey Machine Company, Torrington, Conn.

4th—The bronze medal was awarded to four American competitors: D'Amour & Littledale, New York City; Dwight Slate Machine Company, Hartford, Conn.; Hurlbut-Rogers Machine Company, South Sudbury, Mass.; L. S. Starrett Company, Athol, Mass.

▲ ▲ ▲

Employers' Liability in France.

An Employers' Liability bill was adopted by the French Chamber of Deputies recently, which shows that they can be extremely drastic in such matters when they set out to be so.

The act imposes upon the employer the payment of an indemnity to workmen who are accidentally disabled, if they are made idle for over four days.

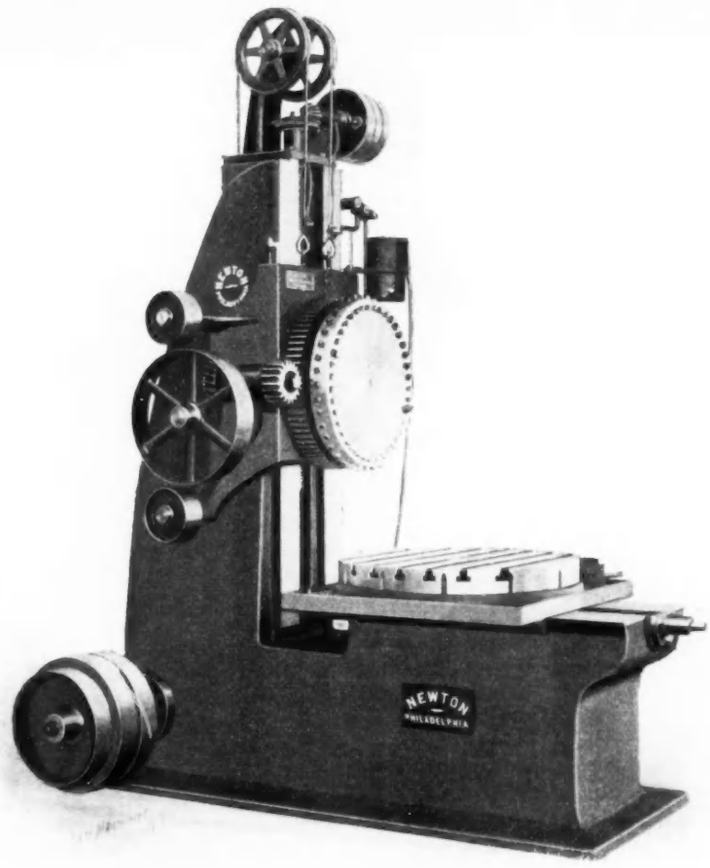
If a workman is disabled for life, the employer must pay him a pension of two-thirds of his wages lost, and in the case of partial disablement the employer must also pay him two-thirds of the wages thereby lost. In the case of temporary disablement, the employer must pay half the wages the workman thereby loses, and in the case of death by accident, the employer must pay a pension to the workman's widow amounting to 20 per cent. of the wages he earned, in addition to 15 per cent. for a single child, rising to 40 per cent. for four children, until they reach the age of eighteen.

In the case of orphans, the pension to be paid by the employer is 20 per cent. of the wages formerly earned by the workman for each child, up to a total of 60 per cent. In the case of bachelors supporting their parents, the indemnity goes to the parents.

In order to secure these payments, even in the event of the employer's insolvency, the bill compels employers to insure their workmen against accidents.

▲ ▲ ▲

The Baldwin Locomotive Works recently received, almost simultaneously, orders from Finland, Japan, Brazil and Canada. This establishment systematically pushes its foreign business, and is successful with it because it does push.



VERTICAL ROTARY PLANING MACHINE.

moved and a third is put in its place—the cutting being thus made practically continuous.

Two of the tools in the cutter head of the vertical machine will be observed to be broader and to project further than the others. These are the finishing tools, which are used in two ways. The other tools are ground like a round nose planer tool, and no great care is used in adjusting them to cut alike. For common work, the broad tools are adjusted to smooth up the ridges left by the roughing tools, a single cut only being made. For nice work, the roughing cut is taken with the broad tools set back, followed by a finishing cut with the broad tools set out and a rapid feed.

Our readers will not fail to notice that the cutters are inserted in the cutter heads at an angle which gives a top rake to the teeth. There is no doubt that the cutters of such tools should have such a rake, precisely as lathe or planer tools should have it. Inserted tooth mills have been made altogether too much on the lines suggested by solid cutters, although the reasons leading to the absence of rake on solid cutter teeth are absent in inserted tooth mills.

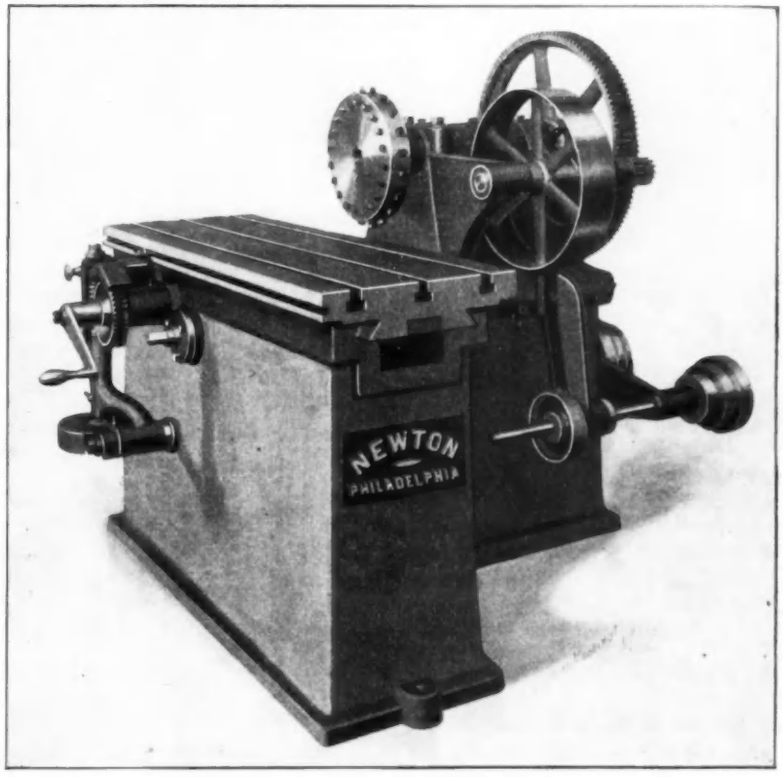
▲ ▲ ▲

"Machinery," published at Johannesburg, South Africa, speaks of the city as "being in a state of financial chaos, awaiting the portentious decision of a retrogressive and implacable legislature." Such is civilization.

Rotary Planers.

We illustrate herewith two newly designed "rotary planers," by the Newton Machine Tool Works, which show the growth of the field to which this style of machine is being applied. The rotary planer, as originally designed, was intended for facing the ends of I-beams and other shapes used in bridge work, but it is now going largely into ordinary machine shops having much plain facing to do.

The horizontal machine shown is intended for general shop work, one of its obvious fields of usefulness being the facing of the tops of lathe and planer legs. The vertical machine was intended originally for facing the sides of locomotive driving boxes. The revolving table will be seen to be provided with index notches which adapt it to this as well as a wider range of work. In work on driving boxes, a fixture is bolted to the table, having parallel ribs which locate the box correctly for the cut. While one box is being operated upon by the cutter head, a second one is placed in position on the side of the table next the operator, and on the completion of the first cut, the table is revolved through a half revolution, and the cut is then started on the second box, when the first is re-



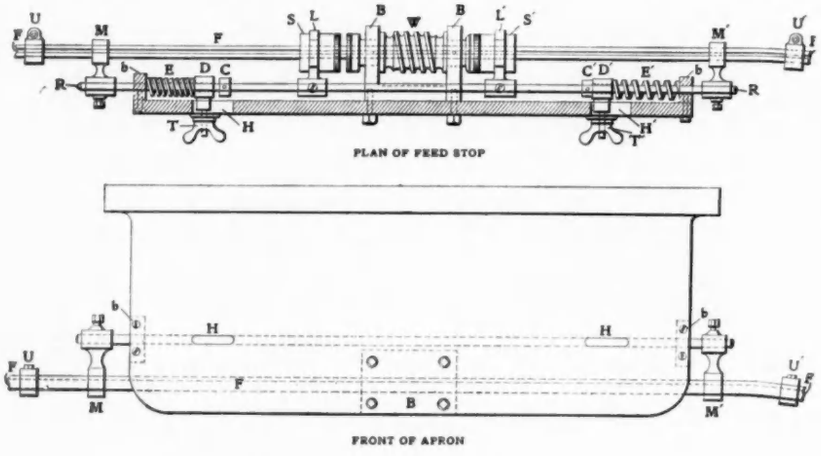
HORIZONTAL ROTARY PLANING MACHINE.

Letters from Practical Men.

A Double-Acting Automatic Feed Stop.

Editor American Machinist:

Having read the description of the automatic feed stop for lathes in your issue of October 28th, it recalls to my mind a similar device, which I designed for my own use about a year ago. It is simpler than the one you illustrate, and has the additional advantage of disengaging the feed whether the carriage is moving either to the right or left. The cast-iron bracket *B*, Fig. 1, is fastened to the apron as shown, and has two forked ends, between which the worm *W* revolves, confined from moving endwise by its two shoulders. This worm turns freely on the splined feed rod *F* (i. e., it has no feather connecting it with the same), and



DOUBLE-ACTING FEED STOP.

has a square-toothed clutch at each end. The two sleeves *S* and *S'* have clutch teeth corresponding to those on the ends of the worm. They have each a feather, fitted to the spline in the feed rod *F*, and constantly revolve with it. At a convenient hight above the bracket *B*, and so as to clear it easily, the rod *R* passes along under the apron, supported at both ends by the small brackets *b b*, screwed to the same. This rod carries the two forked arms *L* and *L'*, which fit into the grooves provided for them in the sleeves *S* and *S'*, respectively. It also has the two arms *M* and *M'* fastened to it by set screws. The other ends of these arms are bored out to make a sliding fit on the rod *F*. *C* and *C'* are collars fastened permanently to rod *R*, while *D* and *D'* are sliding collars, having flat ends fitting into longitudinal slots *H* and *H'*, provided for them in the apron, and screws with thumb-nuts *T* and *T'* to clamp them to the latter. *E* and *E'* are open-wound spiral springs, which, through the sliding collars *D* and *D'*, can be made to exert a pressure endwise on rod *R* independently of each other. These sliding collars *D* and *D'* are bored out about 1-16 inch larger than rod *R*, so that they cannot bind it when clamped to the apron. The drawing shows the device in position with the carriage feeding toward the head stock. It will be seen that spring *E* has been compressed, by forcing the sliding collar *D* toward that end of the apron and fastening the thumb-nut *T*, thereby throwing spring *E* out of action. Thumb-nut *T'* has been unscrewed, and must remain so while spring *E'* is in action. The latter, exerting a pressure on rod *R*, through the sliding collar *D'*, which in turn lies against the fixed collar *C'*, forces it toward the left, thereby throwing clutch sleeve *S'* into engagement. As the carriage moves forward, the arm *M*, coming in contact with the collar *U*, forces rod *R* back, throwing clutch *S'* out of engagement and stopping the feed. If the carriage is feeding in the opposite direction, all we need do is to push collar *D'* to the right, thereby compressing spring *E'*, and fasten the thumb-nut *T'*, then open nut *T*, and the spring *E* will do the rest, the operation before described being repeated. The device works equally well on lathes taking the feed from rod *F* by a bevel-gear. On a lathe of this description, where space was limited and would not allow the rod *R* to be put under the apron, I had a pair of hanging brackets cast, screwed them to the apron, and hung rod *R* underneath the feed rod *F*, slightly altering the manner of making the change from one spring to another (see Fig. 2).

FERDINAND SCHAUB.

Jersey City, N. J.

▲ ▲ ▲

Micrometer Cuts for Files.

Editor American Machinist:

Referring to "Micrometer Cuts for Taps and Milling Cutters," in the "American Machinist," October 28th, how does it apply to files? When I have a piece of sheet or flat iron, and a certain amount of it is to be transformed into filings for that purpose only, I will certainly take it off from the edge, from the length or width, and not from the thickness, because it will be a good deal easier. This is in accordance with the idea of having a small number of teeth in contact with the stock. Now, let me have a piece of tempered (blued) steel and a small amount to be removed by any steel tool (no grindstone or emery wheel), then the only tool is a smooth file (many teeth); a brand new rough file (few teeth) or a cold chisel or lathe tool (one tooth) would not do. If that is so, will somebody explain why?

J. SCHURING.

Cincinnati.

▲ ▲ ▲

Automatic Feed Stops.

Editor American Machinist:

The position of the automatic feed stop for machine tools—the automatic here being for the stop and not for the feed—is a rather peculiar one. A certain, simple and reliable means of stopping the feed automatically when the cutting tool has gone as far as it ought to go, so that work may not be spoiled, and so that a man's attention need not be confined so closely to the job, is such a self-evidently desirable thing, and so easy to devise and apply, that of course it is in universal use—only it isn't. It is one of those things that a fellow can't help thinking of as he stands over the lathe, and so many have been devised that it is hardly possible to describe one in public without having somebody jump up and tell you that he made one just like it, or some fellow that he knew had one like it many long years ago. And yet there are comparatively few in everyday use.

To tell the truth, I suppose that the argument may not be altogether in favor of the automatic stop; there may be some things to be said on the other side. An employer might argue that it might tend to make a man careless, and that, anyway, it could only act as a time-loser for him. When the feed had been thrown out automatically, and the lathe was running along doing nothing and waiting for the man to set another cut, that could mean nothing but lost time.

Feed stops, also, too often belong to the great class of incomplete inventions. Every man knows that the tool should be withdrawn simultaneously with the throwing out of the feed, or else the tool will cut under size at that point, and if it runs long without being drawn out, the edge of the tool will be dulled, too. No automatic feed stop that I know anything about will also withdraw the tool, and most of them only offer to throw out the feed when feeding toward the headstock, while often it is just as desirable when feeding the other way. Of course, I am not here talking of the automatic movements of screw machines, but only of the automatic stops that are got up as improvements on the engine lathe.

An automatic stop which withdraws the tool as well as throwing out the feed might also strike a bell to call the man's attention to the job. If it could also

stop the lathe, that would be another valuable improvement. I have known some nagging superintendents who would also have it ring a bell in the office, but I do not think that is necessary.

In the first shop with which I ever had an intimate acquaintance, I remember an improvised, but very complete and satisfactory automatic stop that was used one night. The shop was run by water power. At one end of the shop there was a vertical rack for the gate, and there was a horizontal shaft with a hand wheel on it and a pinion that worked in the rack. To start the shop, we just hoisted the gate and put a chock in a tooth of the pinion, and let her run. I was, for a time, the engineer. The big planer—a chain planer—was exactly at the other end of the shop. Of course, we built steam engines, as every shop did in those days. The engine beds were too big to cast whole, so they were made of two long, straight sides and two end pieces bolted together, with one or two tie rods in the middle part. After the bed plate was all securely bolted together, it had to go on the planer and be planed off all over the top. Well, one day, Bill Gibbons had got one of these beds on the planer, and started a cut about 1 o'clock. The boss told Bill he'd have to keep that planer running at night, because he wanted the bed and he wanted the planer, too. Now, Bill had promised to go and play at a dance that night, so there was trouble. Soon Bill said he'd fix it all right. First he went to the wheel gate, and instead of the regular short chock he got a longer one, a piece of ⅝-inch iron about a foot long, using one end to chock the pinion, and then he fastened a stout cord to the other end of it. This cord he led along through the shop to the planer. All he had to do then was to stand up a heavy crowbar against the end of the cross-feed screw and fix the cord so that when the crowbar tumbled over, it would pull the cord, yank out the chock from the wheel gate, and shut down the whole business. The engine bed was about as wide as the planer would take in, and Bill set the tool so that the saddle would travel over the end of the crossrail just far enough to shove off the crowbar when the tool had got just across the bedplate. Of course it worked all right. I don't know how Bill fixed it about his pay for the night work, but he probably had some automatic attachment to work that, too.

Lots of such automatic things have been got up from time to time, and nobody at the time has felt that they were the product of any very high inventive ability, or that they called for much pride or exultation. Lathes and planers, if it should be a good selling feature for them, would all to-day have automatic feed stops just as much as a milling machine has; but very few builders seem to have found that the attachment would be appreciated, or would draw out additional dollars. Where a supply of compressed air is maintained in a shop, it may quite readily be pressed into this service. It would be a very simple thing to make an automatic stop for a lathe or planer where a pneumatic shipper is used, and I am quite inclined to think, anyway, that a stoppage of the machine is to be preferred to stopping the feed alone.

TECUMSEH SWIFT.

▲ ▲ ▲

Salt in Lubricating Oil.

Editor American Machinist :

In a recent issue of your paper I noticed an article on "Salt in Lubricating Oils," and in connection with this subject I have an "experience" to relate. About 5 o'clock, on a recent afternoon, the worm shaft of a belt-driven elevator snapped in two, and we were phoned to come to the rescue. Upon arriving, we found one piece of shaft and the pulleys in a heap on the floor, and the other piece, having the worm on it, in its proper place. Of course, a new shaft was the only way out of the difficulty, and we took out the piece of shaft to which the worm was fastened, and returned to the shop. We paid no attention to which teeth of the worm wheel the worm was in mesh with, and thereby "hangs our tale." A new shaft was made and put in, and although everything was as near like the old shaft as it was possible to make it, that worm wheel would not work. It was taken out and scraped, which helped it some. Then it was readjusted for end play, and, in fact, everything was done to make it "keep cool," but heat it would, until, as a last resort, the oil in the case was drawn out, and a lot of water and salt put in, and after a short time a gallon of lard oil was added. This did the business and it has been going ever since, and I believe that if we had put in the salt at the start, it would have saved a lot of profanity and some hard work.

E. CLEMENT JARVIS.

Lansing, Mich.

▲ ▲ ▲

A Gliding Boat.

Editor American Machinist:

In your issue of November 4th, "F. F. H." refers to your notice of recent trial of "a gliding boat" in England, and cites the consideration of a certain mathematical truth as being tantamount to proof of erroneous assumption on part of the designers.

Whatever advantages are expected or realized by the peculiar construction of this boat, must be attributed to the inclined blades. My understanding of the matter is, that the designers aim to produce a craft that will, when at full speed, lift the hull or buoyant portion quite out of the water with nearly the entire weight sustained by the reaction, due to inertia, of the water upon the inclined blades. The propeller remains submerged, and acts in exactly the same manner as in present practice. In other words, with an ordinary boat, the inertia of the water must be overcome and a quantity of water set in motion corresponding to displacement and speed; but with the gliding boat, the object sought after is to utilize the inertia of the water to sustain it at the surface with trifling displacement.

Let "F. F. H." repeat a simple experiment of his boyhood days and "skip" a flat stone over the surface of a calm body of water. If the advancing edge of the stone is inclined upward, it will skip and glide over the surface for a considerable distance before it sinks. Now let him attempt to throw a similar stone *through* the water, and his greatest efforts will fail to send it more than a fraction of the distance attained by the "skipper." It is simply a question of resistance; the lifting component in the first case being but a fraction of what the resistance due to immersion amounts to in the last case.

Another point in favor of the gliding boat is, that with an inclined blade having its forward edge above the surface of the water, a layer or cushion of air is forced under and aft, as evidenced by escaping air bubbles. Tests seem to prove that this cushion of air eliminates, to a certain extent, skin friction.

I am in no way connected with the development of the scheme, and, in fact, do not see how it can be applied to practical navigation; but the idea seems to possess several grains of reason. A. L. S.

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Speeding Up by Arithmetic.

Editor American Machinist:

Referring to William Green's inquiry as to "what became of the other hour?" in your issue of to-day, I would say that this is another case like C. T. Brown's method of finding the measurement of circumference of circle, which is shown in same issue—i. e., the boss' assumption was almost correct, but not quite.

He assumed that if 5 gears, 2 large and 3 small, could be done in 2 hours, that 2½ could be done in 1 hour. They could, but it would not be 1¼ of each gear, but 1 large and 1½ small, and 24 hours would make 60 gears—i. e., 24 large and 36 small, not 30 each. Perhaps the best illustration of the error of the boss' way of figuring would be to follow his method to its logical conclusion—i. e., if 5 gears can be done in 2 hours, 1 gear can be done in 24 minutes, either a large one or a small one, although it is admitted that it takes 30 minutes to do a large one. You could do 1 gear in 24 minutes, but it would have to be 4-10 of a large one and 6-10 of a small one.

You can't add 12 pears and 4 apples and divide by 2 and have 4 apples and 4 pears left.

ROBERT J. HEARNE.

New York City.

[The above is only a sample of a great number of excellent letters received to

help out Mr. William Green. It is evident that many of our readers were interested in his case. He has probably by this time found out why the hour disappeared.—Ed.].

▲ ▲ ▲

Foundry Practice.

Editor American Machinist:

That in many foundries where heavy machinery and general jobbing is done the results are not satisfactory, is not to be wondered at, when the principles of the craft are understood and the methods resorted to are considered. It is no rare thing to see molders conscientiously trying to turn out good castings under torturing conditions imposed by conventionality. A great part of the blame generally cast on the molder should really be lodged higher. If the molder constructed his rigging and had the choosing of his methods, he would then deserve much of the blame, but generally he has to do with things gotten up by men supposed to mark a higher degree on the mechanical thermometer of the world. Some grossly awkward and risky customs originated years ago are yet retained by many foundrymen, and to many of them inconvenience clings, and the origin of much "bad luck" can be traced. That good castings have been made under those customs is true, but they were made at great disadvantage and in spite of risk and awkwardness.

Castings having dry sand cores of any considerable size are favorite opportunities for the application of an old, yet very popular error, the extending of prints through flasks. Theories in favor of the idea are many: "Smaller flasks can be used, and something saved in the way of shoveling and ramming," is the most common claim. Fig. 1 shows a common result of the practice at the time of pouring, and after a lively struggle with stopping sticks, and throwing quantities of sand and water, the melter gets a high percentage of the castings. Then the molder is told that he ought to have tucked the clay, which is the wrong material to use in such cases, around the core a little harder. Evidently no notice is taken of the enormous shrinkage of clay, which causes it to crack and give the metal an outlet.

Convenience and security require a certain amount of room in every flask, and the handling of sand enough to fill it. Fig. 2 shows what might have been constructed for practically the same first cost. With cavity *A* left open until the mold is closed, a rod can be inserted in the vent, and cavity then rammed up; run-outs or overflowed vents would then only follow outright negligence.

A factor which bears essential relation to the output of any establishment is its equipment, and the controlling considerations of the equipment are its cost and efficiency. In equipping foundries many have betrayed points which suggest that many of the principles which underlie the craft are not plain to them. Familiarity with the principles of hydrostatics, compression, friction, cohesion, adhesion, equilibrium, and, in fact, every mechanical principle, is necessary to the getting

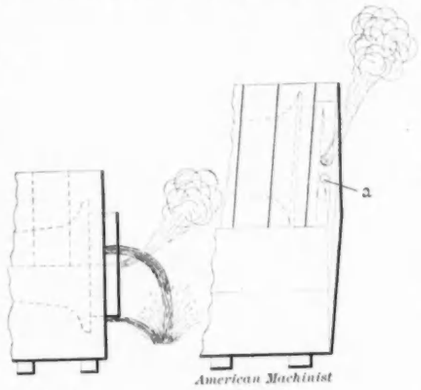

Fig. 1 Fig. 2

BLOWING OUT.

up of foundry rigging fully adapted to its purpose. Before the mind's gaze, the drag should be rammed up; the parting made; every bar located with regard to security and convenience of setting gaggers; the runners located, and every detail in molding the piece gone through, before a move is made toward actual con-

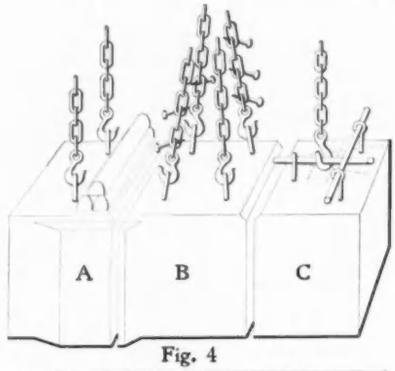

Fig. 4

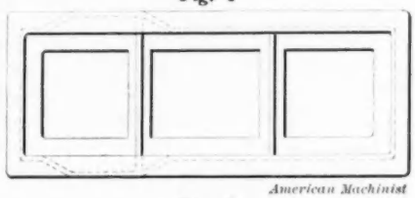

Fig. 3

BALANCING THE LIFT.

struction. If skeletons are to be used, allowance must be made for permanent increase in size due to heating, also for contraction of casting. It is no uncommon thing to see skeletons made to fit so nicely the first time, that considerable chipping is necessary to get them in place for a second casting; that is a result of trying to work too fine. Others are plenty which are too small and cause the waste of lots of time in securing overhanging sand, and thus a "happy medium" is missed on either hand. Errors are often made in the provisions for lifting sections of molds made on either skeletons or plates; some are provided with only two lifting irons, while others, to overcome the bother and risk of keeping them level with pigs, are provided with four, and the "happy medium" is again missed in both cases.

A very common casting is shown in plan Fig. 3. Inside sections of the mold, with the common ways of lifting and leveling, are shown in Fig. 4, *A* and *B*. *C* shows a method in which the use of pig iron, spikes, or even turn-buckles are unnecessary for the correct leveling of sections of molds or cores. It does not matter much what their shape, a slight tap of the hammer will vary the hook or bar, as per dotted lines, to the exact center of gravity. From unreasoning conservatives the method will meet with objections, but their grounds are untenable. For years I have worked the method. Foundrymen, in astonishment and fear, have gazed at it, when it would be within the bounds of reason to expect them to see the point instantly.

H. O'NEIL.

Bristol, Conn.

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Explosiveness of Acetylene Gas.

Editor American Machinist:

I would like to have the fact mentioned that the experimental mixtures of air and acetylene gas, referred to in my article appearing in your last issue, November 11th, showing explosive qualities, were made at atmospheric pressure and at ordinary temperature only. I have seen recent extracts from foreign publications stating that this gas by itself becomes explosive under two or three atmospheres pressure, and that changes in temperature also affect its stability.

E. A. GAY.

Rochester, N. Y.

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The Material for Laps.

Editor American Machinist:

In your paper on "Laps," in your issue of October 7, 1897, "Machinist" recommends cast iron as superior to lead for the material of a lap.

This, I think, may be misleading to some people, because the material of which to make a lap must always be chosen with some regard to the material which has to be lapped. It would obviously be wrong to use a cast-iron lap to lap a hole in similar cast iron, for the emery or other grinding material would become embedded in the work instead of in the lap alone.

For lapping soft metals, a soft lap such as may be made from lead is most suitable, but for hardened steel work "Machinist" is probably quite right in recommending cast iron.

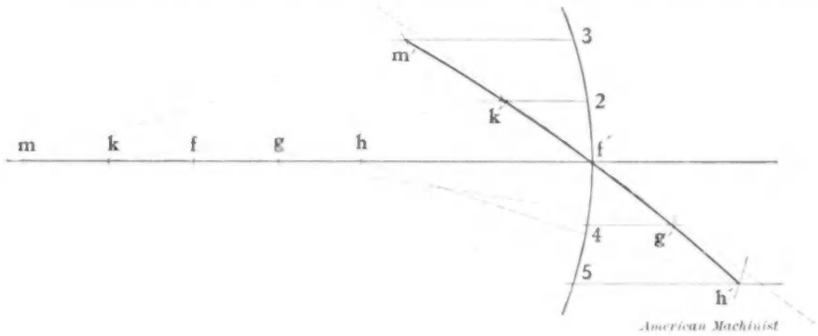
LENSES.

Leicester, Eng.

That Universal Screw-Cutting Device.

Editor American Machinist:

As one who has ever taken a lively interest in universal screw-cutting devices, I was naturally attracted by the account given by Mr. Miller in your issue of October 14th, of the attachment used by Messrs. Barequand & Marre, of Paris. The principle involved is certainly ingenious, and, as far as my experience goes, novel; but I think, upon closer examination, it will not be found quite so easy to carry into effect as many may at first sight suppose. From the description it might be inferred that, with an angle template as shown in Fig. 2 (page 778), it would be possible to cut a variety of threads, not varying greatly in pitch, by simply altering the angle of the template *c*. A little consideration will, however, show that this is not the case, while a further and very important fact will also become evident, viz., that the upper edge of the template must not be straight, but curved, the exact contour varying with the degree of angular movement which it is required to give to the lever *a*. This will be evident from the following considerations:



METHOD OF DEVELOPING THE TEMPLATE FOR SCREW-CUTTING DEVICE.

Let *f f'*, in the diagram herewith, represent the lever in its horizontal position, and from *f* step off equal spaces *f g*, *g h*, *f k* and *k m*, representing equal movements of the slide rest. With *f* as a center, and radius = *f f'*, draw the arc 3 *f'* 5, and on this set off equal arcs *f'* 2, 2 3, *f'* 4 and 4 5, representing equal angular movements of the lever. Draw horizontals through the points 3, 2, 4 and 5. With *g* as center, and radius = *f f'*, cut the horizontal 4 *g'* in *g'*, and similarly, with the same radius, from *h*, cut the horizontal 5 *h'* in *h'*. In the same manner the points *k'* and *m'* are obtained, and the curve *h' g' f' k' m'* drawn through these points is the required shape of the acting surface of the template.

It is evident that the degree of curvature will vary with the amount of supplementary feed it is desired to give to the guide screw, and also with the length of the lever, if this should be altered. It will be seen that the deviation from a straight line is quite considerable in the example shown, and in any case, in practice, the divergence would be sufficient to seriously impair the accuracy of the screw being cut. Finally, it is obvious that any attempt to vary the inclination of such a template as this would make "confusion worse confounded."

One is driven, therefore to the conclusion that the device, as it stands, is not of practical value as a universal screw-cutting device; although there may be circumstances under which it would pay to make such a template as above described, in order to cut a thread which could not otherwise be originated.

The device of using a straightedge set at various angles in order to give various amounts of supplementary feeds, is beautifully simple at first sight, but clearly its accuracy is vitiated by the "angularity of the connecting rod," so to say. This suggests the substitution of a connecting rod of infinite length. The plan which comes to my mind is, to remove the bevels shown in Fig. 2 (page 778), and fix on the end of the slide-rest screw a gear-wheel mashing into a rack carried in a vertical slide fixed to the slide rest. The lower end of this rack (which might be fitted with a friction roller) would rest upon the straight-edged angle piece boring the template. In this way varying amounts of supplementary feed could be obtained by altering the angle of the simple template, and the desired end attained.

M. E.

[The suggestion given is a good one, I think, but still, perhaps, it would not have such great advantages as might appear at first sight, because, with such slight angular movements of the lever as could usually be arranged for, the curvature of the template could be neglected for ordinary work not requiring extreme accuracy, while for the most exact work possible to produce no practical refinements in laying out the template would, I think, suffice, whether the lever or "M. E.'s" plan were to be used. This arises from the fact that were extreme accuracy to be required, the fact would have to be recognized that the screw in the rest, as well as the lead screw, would possess errors; and also that the bevel or spur gear on the screw would be more or less imperfect. In view of this, I think a very accurate screw could be produced only by a series of approximations—i. e., a trial cut and a test of the helix so produced, with such modifications of the template as might be indicated by the test. This would correct all errors from whatever source they might arise, and I can think of no other way of doing that.

At the risk of seeming captious, I venture to point out that a roller or pin of sensible diameter resting upon the template would call for some modification of the curve as developed by "M. E.," which is correct only for a point such as a knife-edge resting upon the template.

With regard to changes in the length of the lever, it should be borne in mind that the same angular movement of the lever would be called for by any given set of conditions, regardless of the length of the lever.—F. J. M.

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American Machinery in Russia.

Editor American Machinist:

The "American Machinist," in a recent issue, states that after January 1, 1898, machinery will be admitted into Russia free of duty.

In regard to this you have been misinformed. There will be no change in the existing rates. The duty is 2 roubles 10 kopecks per poud. The Russian poud is 36 pounds. A rouble is 50 cents of our money, and there are 100 kopecks in the rouble. The duty is equivalent to $1.05 for 36 pounds, or nearly 3 cents per pound.

Our manufacturers might infer from this that they could not get into this market. This is not the case, as large amounts of American and German machinery are now coming into Russia.

It would pay our manufacturers in all lines to investigate this market, as there is a great development now in progress, and for the future, in Russia.

The high duties enable the few manufacturers here to ask enormous prices, and get them.

In all of the leading manufacturing concerns in Russia and Germany I find the "Machinist." Frequently I receive news of our own company from the customers (per the "Machinist") before receiving same direct from our works.

CHAS. DAVIS,
Pres. Davis & Egan Machine Tool Co.

Moscow, Russia, Oct. 28th.

[The item referred to by Mr. Davis related to agricultural machinery only. On this head we print, below, an extract from the "Times," of London.]

The importance of Russia as a market for agricultural machinery is shown in the last British Consular report from St. Petersburg. The imports to Russia are rapidly increasing, and amount now to nearly £600,000 per annum, of which Great Britain and Germany send nearly a third each, but the Russian imports

from Germany are increasing, while those from Great Britain show a tendency to decline. Recently a committee was appointed by the Minister of Finance to examine the duties on imported agricultural implements and machinery. The landed proprietors desire the reduction or total abolition of these duties, but the greatest opposition to this was naturally displayed by Russian manufacturers. The committee examined a great number of witnesses, and at the final sitting the chairman stated that the committee would recommend the entire abolition of the duties of some machines and implements, a reduction on others, and the free importation into Russia during the next five years of certain machines not made in the country, such as sheaf binders, steam plows without engines, compound thrashing machines, hay scatterers, sorters with spiral cylinders, potato sorters, cream separators, brickmaking machines, manure spreaders, horse rakes, etc., and, further, that agricultural machines and implements newly invented and in use abroad be also allowed to be imported free of duty into Russia during the next five years.

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Safety Apparatus for Elevators.

Editor American Machinist:

I enclose you blueprint of safety apparatus for elevators; only the top of the carriage is shown. The action is as follows: The hoisting chain or rope is attached to the sling chains *B B'*, through the ring *E;* the balance weight sling chains are also attached to *E* from two short levers *F F'*. The sling chains *B B'* are attached at other end to the long levers *G G';* the balance weight chain is attached to two short levers similar to *F F'*, and on the same shafts, but to one side, as shown at *H H*.

In ordinary working, the balance weight acts only as such, on account of the excess of leverage of the hoisting chains; but should the hoisting slings *B B* slacken up, the balance weight chain will tighten and throw in the shoes *D D D' D'*, or should the hoisting chain break, the balance weight chain at once throws the shoes onto the guides, and they, having an eccentric action, tighten on the guides more and more as the load increases. The device is patented, and has been in use for several years on freight elevators.

ERNEST W. NAYLOR.

Philadelphia.

[The device shown is one of those which operate all right if the elevator hoisting rope breaks according to theory. Unfortunately, the hoisting apparatus has different ways of giving out. The carriage may descend at a dangerous speed, especially if heavily loaded, and still sufficient tension may remain upon *B B'* to overcome the pull of the balance weight chains upon the short ends of the levers, and so the shoes will not grip. If the balance weight could be so attached as to always set the brake, and then have it thrown or held off by the operator for hoisting or lowering, it would more nearly satisfy the requirements of the case.—Ed.]

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The Details of Blacksmithing.

BY JAMES F. HOBART.

Tongs are so necessary to the smith that it seems strange to find no better care taken of them. Watch a blacksmith a few minutes and note how his tongs are abused. First, he will carelessly let them get too far into the fire and become red-hot. In such condition the jaws of the tongs become soft and the tremendous leverage of the hand on the legs of the tongs causes them to be bent out of shape, letting the legs come together and the jaws stay open. To cure this trouble, the jaws are laid on the anvil and struck several hearty blows with the hammer; the result being to distort the jaws, even though it pelted them into such shape that the work could be held with them after a fashion.

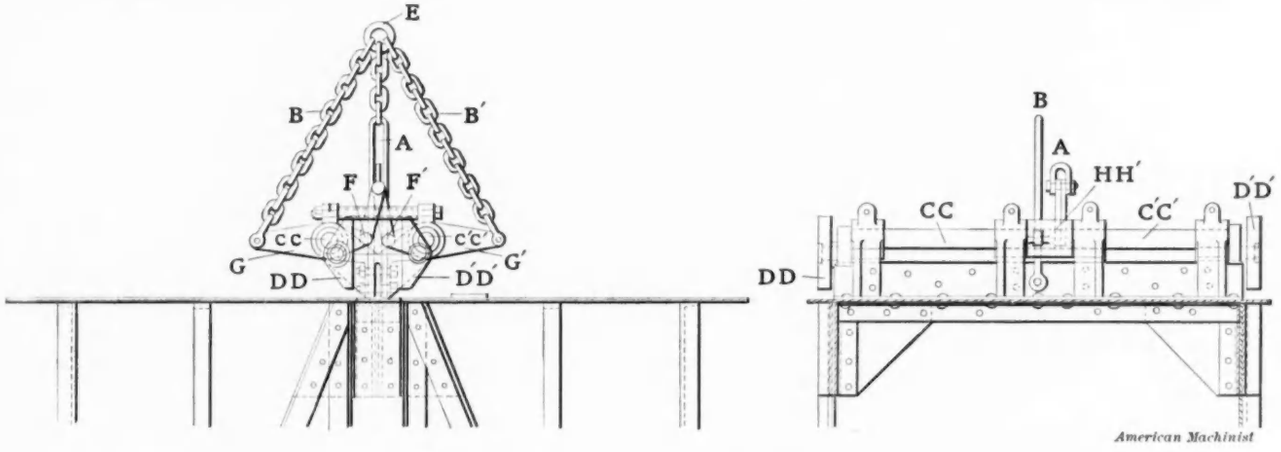
As if such treatment was not enough, the tongs are still further abused by being thrown into a tub or tank of water every time the smith has occasion to lay them down for a minute or two. Every time the tongs get too hot they are likewise "doused" into the water trough. Just imagine the effect this treatment must have upon the iron or steel of which these tongs are made. Heat a piece of the same kind of metal 100 times and cool it suddenly just as many times, and what is that piece good for? It would not be good for much of anything, and the smith knows it, yet he goes on day after day abusing useful tools in that manner and yet often wonders "what breaks up all the tongs."

THE PROPER TREATMENT.

for tongs is to handle them carefully. Never use the tongs as a maul for breaking up coal, or driving out bolts, or as a projectile to be launched after stray dogs. Never hammer the tongs when they are cold and never be obliged to re-form the jaws (better reform the smith) because they have gotten out of shape by gripping with them while they are hot. Keep the tongs out of the fire. If a bit of iron is to be heated, drop it into the fire and remove the tongs. Keep them away until it is hot, then poke it out and the cold tongs will be able to hold the work in good style while the forging process is going on.

If tongs do get too hot, through use on some very particular piece of work, don't throw them into the water trough. Such treatment is tough, but it don't toughen the tongs. On the other hand, it makes them very brittle by crystallizing the iron, so that a jaw breaks suddenly or a leg drops off just back of the rivet.

If tongs must have their jaws re-shaped, do it under a good heat, but *do not* hammer the tongs while cold or nearly cold. It is an old adage that "The blacksmith went to hell for hammering cold iron." Therefore, do not hammer cold tongs. Heat them well first, and do as little hammering as possible. The tongs should be



SAFETY APPARATUS FOR ELEVATORS.

so well used that there should be no need of hammering or otherwise re-shaping them until long use and legitimate wear has made the tongs so weak that the jaws must be new-laid.

NEW-LAYING TONGS.

When a pair of blacksmith's tongs have become so thin that they bend in the jaws when the work is gripped, then they must be "new-laid" by welding a piece of iron to each jaw. It is quite a job to take out the rivet, weld a piece of iron to each jaw, replace the rivet again and then forge up the jaws so they will meet each other all right. A much quicker way is to prepare the two pieces of iron that are to be welded to the tongs, but putting them between the jaws and hammering lightly under a low heat. After the pieces have been well bedded together and to each jaw put a piece of cardboard (a little bigger than the pieces of iron) between the two pieces to be welded on, then take a good welding heat and hammer all together; jaws, new pieces and cardboard.

It will be a surprise to some smiths to find that the cardboard will prevent the two pieces of iron from being welded together, but it will do so every time. There is no need of cutting the cardboard to the exact shape of the jaws. Simply tear off a piece of the card, providing one straight edge which is pressed back towards the rivet as far as it will go, and let the rest of the card stick out all around. It will burn off close up to the iron, also char clear through, but the charcoal will be there, and it will prevent the pieces of iron from uniting when the weld is made. Really, it forms an artificial "cold shut" in the iron. If the edges of the iron should draw over the cardboard under the hammer and stick together, a light clip with a cold chisel and hammer will cause the new jaws to fly open all right.

I have seen a smith do this thing with dust scraped up from the floor of the shop. Something better still than cardboard or dust, is a bit of asbestos paper. This will do the job and not even become charred by the fire at a welding heat, although it will not be very good asbestos afterward, and its chemical make-up may be somewhat damaged during the operation.

FORGING EYE-BOLTS.

The first eye-bolt a 'prentice ever forged probably looked like a knot in a birch withe, "terribly one-sided." The correct way to make eye-bolts is with formers under a steam hammer, or in a drop press: but we are talking mostly of hand work at present. There are two things to be done when making a nice-looking eye-bolt, with a clean, even bend and a smooth weld. One of these things is, to offset the iron before beginning to bend the loop. The offset need not be very heavy—in fact, a simple sharp bend will do in the iron right where the end of the rod comes back after it has been bent around to form the eye. Take a good heat at this point, lay the rod across the anvil, the part to be formed projecting beyond, and the point of off-set resting on the corner of the anvil. Strike a sharp, quick blow on the rod an inch or two *beyond* the corner of the anvil. The effect of such a blow will be to make the off-set, also to begin the bending of the eye.

Before this operation has been gone through with, the end of the rod should have been "scarfed," the same as for making a lap weld, with the exception that no upsetting is necessary. The scarf may be rather longer for an eye-bolt than for a lap weld—say, one and a half diameters for the weld and two diameters for the eye-bolt. After finishing the bending, which may be done entirely around the horn of the anvil, be sure that the shape suits the eye before welding. A one-sided eye-bolt can be corrected before welding, but if attempted afterwards, the iron is sure to be jammed and dented, and the eye-bolt becomes second-hand even before it is a new one.

To make the weld, see that the lap is well hammered down before taking a welding heat, for the closer it fits the better will be the weld. Commence heating with the lap uppermost in the fire, for if placed downward, the lap will get most of the heat, and burn before the shank has got anywhere to a welding heat. Finish heating with the lap downward, use clean sand as a flux, and use plenty of it. Begin hammering at the very tip of the lap. Strike light blows here, and heavier ones as the hammer moves up towards the eye. The tip of the lap, being thin and narrow, should be hammered first before it loses heat. The thicker portions of the iron do not cool as quick, and may go until the last for this treatment.

Be careful not to burn the iron at the weld. A slim place or a hole does not increase a man's confidence in that eye-bolt. If, however, the shank of the eye-bolt should be made too small by overdrawing, or by burning, just chip into it with a cold-chisel and drive into it a wedge piece of iron containing sufficient metal to bring things up to size. Then take another welding heat and forge the bit of iron right down into the body of the eye-bolt. If a corner of the lap refuses to weld down, a bit of soft sheet iron driven under the unwelded part and another heat taken will cause everything to weld down smoothly and in good shape. Finish the shank by swaging with a pair of half-round dies, and the eye-bolt will come out clean and round.

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Female Labor in Machine Shops.

"It is a generally admitted fact that one of the principal reasons why American manufacturers of machine tools are able to export machinery to this country, and to successfully compete with our makers in neutral markets, is the unrestricted use of labor-saving machines and appliances which the American manufacturer is able to command. Many of these machines are of so automatic a character that an intelligent man is able to attend to several at one time, and the cost of production is thus enormously reduced. Contrasting this condition of affairs with the 'one-man-one-machine' cry of which we hear so much on this side of the Atlantic, it is not difficult to find at least one very substantial reason for the growth of the American export trade in machine tools. But while we have no sympathy with the attempts of the A. S. E. to restrict progress and to seek to impede the natural development of the engineering industry of this country, it must be admitted that our American competitors are showing us that it is very easy to reach the other extreme. An example of this is afforded by the Lozier Manufacturing Company, of Toledo, who have introduced female labor, employing girls to work milling, drilling and other machines used in the manufacture of bicycle parts. It is to be hoped that this exploitation of cheap labor will receive an early check. Obviously the competition of female labor in the lighter occupations is only to be expected, but we think few will be inclined to admit that the manipulation of machine tools is either a suitable or desirable occupation for women."—"Mechanical World," Manchester.

The above extract from an English contemporary is evidently founded upon a misapprehension or an incomplete knowledge of the facts, for which one of our American contemporaries is more to blame than is the "Mechanical World." The women employed at Lozier's are doing only such light work as women have been accustomed to do in factories for many years; and in many places throughout Great Britain women can be found doing work, both inside and outside of factories, compared with which the work that is done by the women at Lozier's is mere child's play.

It would be interesting to know just what bearing the employment of women here has upon the growth of the export trade in American machine tools. The only machine tool building establishment we know of in the world that employs women in its shops, is not American, but French, and is located in Paris.

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Underpaid Postage on Foreign Mail Matter.

We are convinced that the matter of prepayment of postage on foreign mail is one which should receive more attention than is generally given to it in many of our manufacturing establishments. The different rates required on the different classes of matter make the subject one of some complication and unless it receives careful attention mail matter is very apt to arrive at its destination under-paid, and in which case a penalty is

exacted, usually of double the amount of the regular postage which should have been paid upon the matter. In some cases this becomes exceedingly annoying. We have a letter from an engineering friend in London in which he states that at some periods the amounts paid as penalties on underpaid mail matter left at his house amounted to more than his house rent, and he was obliged to leave orders at his house to refuse all underpaid matter. This led to some misunderstandings and disappointments, but it seemed to be a measure necessary to be taken for self-defense. In one case he says he paid 50 cents deficiency for some notices of new books which he had no particular interest in, and in another case he received what he calls a "perfect whirlwind" of a letter from an American editor on account of the refusal of an underpaid package.

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Combination of Steel Tube Manufacturers.

The latest combine is that of the manufacturers of steel tubing. They are formed into a corporation which is said to represent about 90 per cent. of the tube output of the United States. It is composed of the Beaver Seamless Tube Company, the American Weldless Tube Company, the Shelby Tube Company, the Ellwood Tube Company and the Greenville Tube Company. The new corporation will be known as the Shelby Tube Company, and is capitalized at $5,000,000. W. H. Miller, of Shelby, O., will be president and general manager, and the main offices will be at the Shelby plant. Colonel H. A. Lozier, the bicycle manufacturer, who is also largely interested in tubing manufacture, has been one of the promoters of the combination, and it is said that the minimum output of the combined mills will be 50,000,000 feet, and that an arrangement will be in force by which the different classes of tubing will be assigned to specific plants, so that each one can be occupied upon the class of tubing it is best fitted to produce.

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An effort is being made to erect a monument to the memory of Eugene Field, "the poet of childhood," and we are informed that about $8,000 is needed to complete the required amount. Anyone who contributes to this, even to an amount as low as $1, receives a book entitled "Field Flowers," which contains some of the choicest of Field's poems, illustrated by thirty-six of the leading artists of the day, each of whom contributed one or more original drawings for the book. Had this work been paid for, instead of being done as a labor of love, the book could not have been produced at less than about $7 per copy. Those of our readers who may feel like contributing, or may wish a copy of "Field Flowers," should address Eugene Field Monument Souvenir Fund, 412 Fort Dearborn Building, Chicago, Ill.

Technical Books.

ESSENTIALS OF GEARING. By Professor Gardner C. Anthony, A. M. Published by D. C. Heath & Co., Boston. 84 6 x 7-inch pages; numerous engravings and plates. Cloth, $1.50.

We have in previous issues had occasion to commend in very high terms some of the predecessors of this book in the same series, called the "Technical Drawing Series," and it is perhaps necessary only to say that the work now before us fully maintains the author's reputation as a careful and conscientious writer, who takes pains to be fully informed, and then uses excellent judgment in the selection of material for presentation, and presents it in a manner calculated to be most useful to readers. As the title indicates, the essentials necessary to a fair understanding and working knowledge of the subject only are given; but the reader is referred to the literature of the subject in such definite manner as to enable him to pursue the subject as much further as he may desire, and to the best advantage in point of economy of time and general results. We consider the book, both as a treatise and a work of reference, a very valuable addition to practical technical literature. Especially to be commended are the folding plates, which are so arranged as to be conveniently used in connection with the text, the notation and formulas on pages 65 and 67, and the problems on pages 63 and 79, with the lay-out for the same on plates 14 and 15.

We have received a copy of the "Proceedings of the Fifth Annual Convention of the National Railroad Master Blacksmiths' Association." An inspection of its contents shows that the members of this association, as usual, discussed practical subject in a practical way, and there can be no doubt that every member who attended the meeting, or who reads this volume of proceedings, will be benefitted personally, and will be a more valuable man for the road with which he is connected. Copies will be supplied at 50 cents each, by the Secretary, Geo. F. Hinkens, St. Paul, Minn.

Among foreign contributions to the bibliography of American machinery during the present year, is a brief treatise on "L'Outillage Américain pour la Fabrication du Velocipède" (American Machine Tools for Bicycle Manufacture), by Monsieur F. Mandon, Paris. It is published in pamphlet form, and is an extract from the Bulletin of the Society of Encouragement of National Industry, for April, 1897, before which society M. Mandon, by invitation, delivered the address. It consists essentially of illustrated descriptions of some of the machines made by American manufacturers well known to our readers, and is an appreciative review of their advantages for this line of manufacturing operations.

We have received "Part 8" of Easy Lessons in Mechanical Drawing and Machine Design, by J. G. A. Meyer, and find it devoted to the development of shade lines, and in this the conventional method usually followed in drafting rooms is given and explained. This number also presents some practical rules and useful data, takes up the subject of mensuration, and ends with some practical examples in machine design. It is published by the Arnold Publishing Company, 16 Thomas street, New York.

We have received from Prof. D. S. Jacobus reprint of an article by him which appeared recently in the "Stevens Indicator," and in which he sums up the results of his and others' experiments in the matter of the determination of the percentage of moisture in steam; regarding which, it will be remembered, he has presented various papers before the American Society of Mechanical Engineers.

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Artificial silk is coming into use, and seems to compare well with the product of the worm. The inventor of the process of manufacture is the Count de Chardounet of France. It is said that the worm merely mixes vegetable matter, such as mulberry leaves, with a gummy substance, and then winds it into threads, and that every detail of the process is duplicated in the new invention. The cost of the silk is by this means reduced three-fourths.

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Stories continue to come to us of the success and the extending use of the motor cycle in France. It is estimated that 3,000 are used daily in Paris for delivering and collecting goods and similar business uses, besides the many that are used for pleasure. The Comte de Dion recently sent two of his machines from Paris to Berlin, they making the trip, 745 miles, without damage or accident, in 124 hours, or at the rate of six miles an hour. The roads traversed through Belgium were described as horrible.

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A discharged engineer, probably drunk, broke into an engine room recently and slacked some of the cylinder-head nuts and loosened up the pillow blocks. A press dispatch says that "but for the vigilance of the watchman, the engine room, and perhaps the entire factory, probably would have been demolished in the morning when the engine was started." As far as we can see, it was a scare for nothing. Nobody was in any danger.

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Those of our readers who may be curious to know how many freak propositions have been made for the improvement of the locomotive, and how many of them may be piled onto one machine, should see the poster recently issued by our contemporary, "Locomotive Engineering," 256 Broadway, New York. It contains a picture of a locomotive which

is a curiosity, and for which claims of a speed of 217 miles per hour and a saving of 117 per cent. of fuel, water and oil, are made; which claims are fully as reasonable as most of those made for freak locomotives, and other machines as well.

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The cable informs us that the editor of a German paper published in Breslau, who had commented upon the frequency of railroad accidents in Germany, has been indicted for "insulting" Herr Thielen, Minister of Public Works, who has charge of the Imperial railways of Germany. It is thus made clear that editors who propose to comment upon railroad accidents in Germany must proceed much more cautiously than editors are in the habit of doing in such matters in America. Certainly no one here would think of having an editor indicted for insulting anyone connected with railroads in connection with such comments, but it is open to question if many of our American editors do not insult the intelligence of their readers by the kind of comments they publish regarding railroad accidents.

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Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer questions by mail.

(164) H. H., Philadelphia, asks for information regarding the methods of making permeability tests of material for magnet cores. A.—See an article on this subject by Geo. Moffat, in our issue of July 15th last.

(165) J. M. K., Pittsfield, Mass., asks: In cutting taper taps, such as pipe taps, should the tools be set square with the taper or with the center line of the tap? and what is the general practice? A.—The tool should be set at right angles to the center line of the tap, and this, we believe, is the general practice.

(166) J. J. N., Steelton, Pa., writes: Can you name a receipt for a cement which will attach canvas to the faces of turned cast-iron pulleys? A.—A receipt which is recommended for fastening cloth to polished shafts, and which we think would do for the purpose you mention, is as follows: Give the shafts a coat of best white lead paint; this being dried hard, coat with best Russian glue, dissolved in water containing a little vinegar or acetic acid.

(167) C. M., Syracuse, N. Y., asks: If a certain mixture of air and gasoline is exploded in a closed vessel, can I have another explosion of same mixture in same vessel take place before the pressure of the first charge is consumed? A.—We are not quite sure that this has been done, but we can see no reason why a second charge pumped into the cylinder would not explode if it were ignited before becoming mixed with the products of combustion remaining in the cylinder, and it is likely that the act of pumping such a mixture into the closed vessel would cause it to explode.

(168) W. P. H., Moline, Ill., asks: 1. Are there any practical means of propelling a boat in very shallow water, other than by paddle wheels. A.—The Thornycroft's establishment has built a number of light draft screw-propelled boats in which the screws are placed in tunnels under the vessel, with about half their diameter projecting above the normal water line, and with the blades not projecting below the keel. Such a vessel is described in "Engineering," of London, in issue of October 22d. 2. Has the jet propeller ever been in practical use, and, if so, where may I get information about it? A.—We know of no practical use of jet propellers.

(169) F. B. C., Passaic, N. J., asks: What is the difference between machinery and Bessemer steel, and is cold rolled steel made from both? A.—Machinery steel is a special name given to Bessemer steel which is made with special reference to the requirements of machine constructors, and machinery steel is Bessemer, though Bessemer steel is not necessarily machinery steel. Machinery steel is usually so low in carbon that it will not harden by the ordinary methods for hardening steel. Cold rolled steel, we believe, is made from low-carbon, soft Bessemer steel.

(170) W. K., Brooklyn, N. Y., asks: What makes a belt adhere to the face of a pulley, so that it can transmit power? Is it due to atmospheric pressure on the back of the belt pressing it to the face of the pulley, or is it due entirely to friction? and what is friction? A.—The adhesion of a belt to the pulley is due, primarily, to the tension given the belt, which pulls it to the face of the pulley. This incidentally excludes the air from the surfaces between the pulley and belt, and the pressure of the atmosphere outside may then help to press the belt to the pulley; but whether the atmospheric pressure has anything to do with it or not, the belt is driven or drives a pulley by friction only. Friction may be defined as that force which resists relative motion between two bodies which are in contact with each other.

(171) W. L., Philadelphia, Pa., writes: Suppose we have a pipe 8 inches diameter and 1,500 feet long, covered with wood 4 inches thick, lined inside with tin and put in the ground for carrying steam to an engine. What will be the pressure at the engine, the pressure at the boilers being 120 pounds? A.—The pressure at the engine may be practically the same as at the boiler. It will depend somewhat upon whether the pipe is straight or has elbows in it, and also as to whether the pipe is large for the amount of steam carried through it. If it is large, the pressure will be practically maintained throughout its length, whereas if it is small, so that the current through it is rapid, the pressure may fall considerably; but the amount of this fall cannot be determined unless all the conditions are known.

(172) W. W., Brooklyn, N. Y., asks: How high, practically, can water be lifted in a pipe or tube by means of a suction pump, suction only to be used? W says that a column of water 1 inch square, 34 feet high, being equal in weight to that of the atmosphere, or nearly 15 pounds per square inch, and in consequence of the weight of the valves, the imperfect fit of pistons, etc., the practical limit is about 30 feet 6 inches. On the other hand, B says he can lift water in vacuum, by suction only, 100 feet, or more if he so desires. Who is right. A.—Commonly speaking W is right. Water cannot be lifted at all in vacuum. It is lifted, by means of a suction pump only, by the pressure of the atmosphere acting upon it. As a matter of fact, however, the ordinary limit of the suction head has been exceeded by a special pump made with that object in view, and you will find in our issue of January 3, 1895, an illustrated description of such a pump, with a full treatment of the principle upon which it operates.

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Directions for Case-Hardening.

We receive many inquiries regarding methods of case-hardening, and before us lies a little book entitled "How to Case-harden, Color and Anneal with Granulated Raw Bone." The publishers, the Rogers & Hubbard Company, Middletown, Conn., inform us that they will send this book, free, to any reader of the "American Machinist" who asks for it.

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Motors on Turn-Tables.

The Baltimore & Ohio Southwestern Railway has been trying electric motors on turntables. It cost an average of less than one-half a cent for each time the table was turned. When the same table was operated by hand it cost 12 cents for each engine. The yearly saving is said to be about $709.

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The Raddatz submarine boat, at Oshkosh, Wis., was recently submerged for three hours to a depth of eleven feet. Two men were in the boat, and the air supply proved to be quite satisfactory. The water was so muddy that nothing could be seen from within. The boat was under the complete control of the occupants, and rose or sank promptly as desired. Nothing is said of its running. It is getting quite within the lines of possibility that vessels of this class may be valuable and terrible agents in warfare.

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It seems that much ready-made American joinery, which is comparatively low in cost because of our abundant timber supply, but more probably on account of our methods of manufacture, has been imported into Great Britain. Of course, this means that the cost of house construction is reduced, and as practically everybody in Great Britain lives in a house, the benefit of reduced cost of joinery ought to be quite generally felt ultimately. But the Joiners' Union of Glasgow evidently does not care for that view of the case, for it has withdrawn its members from work in all houses in which this cheap American joinery is being used.

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F. R. Ketcham, who was formerly a conductor on the Northwestern Railroad, and took part in a strike, has been given a verdict of damages in the sum of $21,666.33 against that road, for having been black-listed.

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Pittsburg is to have a statue of Tubal Cain. It is to be of gigantic size and placed at the confluence of the Allegheny and Monongahela rivers.

AMERICAN MACHINIST

Published Thursdays by

American Machinist Publishing Co.,

256 Broadway, New York.

John A. Hill, President and Treasurer.

C. A. Hansmann, Sec'y.

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Space in advertising pages only is for sale.
We invite correspondence on subjects pertaining to machinery.
Name and address must always be given, though not necessarily published.
Communications for or relating to the reading columns should be addressed to the Editor. All business communications should be addressed to the Company.
Subscribers can have their mailing address changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once. Date on wrapper denotes week with which subscription expires.

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Entered at Post Office, New York, as second-class mail matter.

For Sale by Newsdealers, Everywhere.

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A Government Armor Plant.

If we concede that steel armor plates in large quantities are a national necessity, and a necessity that must continue, then the suggestion that the government should own and operate a plant for their production is a most natural one. The discussion of such a proposition, when it appears, cannot properly be avoided. It is, fortunately, one which may be discussed without presumption of political or partisan bias, or motive in either direction.

A machine shop may usually be run, in these days, quite comfortably without having a foundry as a part of it. The castings may be furnished by some prosperous independent foundry, and all may be going along smoothly, until the machine shop man bethinks him that if the foundryman is getting profit from the making of the castings, that profit may be saved and added to the profit of the machine work. The machinist's foundry, when built, may realize some of the anticipated profits, but sometimes such ventures do not. Other things being equal, it might also be argued that if, in the making of steel armor plate, there were profit for any firm, there must be the same profit accessible to the government enterprise. But the making of armor plate is business, and it is so difficult to think of the government—almost any government—doing business in a business way. You find streaks of business in most government affairs; but business through and through, business without soft spots, business without leaks, seems to be, in government work, a practical impossibility. The pace of government work is killing, if nothing else is; the winning pace is the antipode of it. If anyone is familiar with the hum of industry, and if by any chance he strays into a government workshop, he is strongly impressed with the conspicuous absence of the hum. The incentive to utmost effort, if it exists anywhere in the employment of the government, is not in the workshops, and the results of it do not appear in the values they produce.

Then, it is so impossible to think of a government shop as up to date. The tools and methods may be of the best at the moment of their adoption, but never after that, while they may hold their ground for a generation or two. The vicissitudes of business which wipe out shops and work the destruction of the unfit, have little play upon the government plant. If up-to-dateness is anywhere imperative, it must be in an armor-plate plant. This complete newness of equipment may be essential, not only to profitable production, but without it the precise material desired may be impossible to produce. New processes arise so suddenly, and are often so revolutionary in their requirements, that the continual rebuilding of the most costly facilities is the most familiar thing in the history of steel-works management. The other day the Harveyizing process was the great prize in defensive construction; to-day we are told that it is superseded by the Krupp process. The first cost of a plant, however honestly it may be estimated, can certainly have little to do with the continual cost that may be involved in its efficient maintenance. In launching out into a field so uncertain as the manufacture of steel armor plate, nothing can be anticipated but financial loss, with no apparent advantage.

With a fully equipped and up-to-date plant in actual operation, the cost of maintenance and of production would still be impossible of computation, and would have the widest fluctuations, from the fact that no steady operation of it could be calculated upon. The capricious action of Congress would, each term, probably be in some way upsetting the arrangements of the preceding. Skilled laborers could not be gathered and trained and held efficiently operative. A great manufacturing establishment is as different in its operation as it is possible to imagine, from the running of a simple machine. Some may think that the simple turning on of a supply of money will make the thing go, just as the turning of a steam valve makes the engine go. The only thing certain when the money is turned on is, that it is sure to run through; whether any results will be visible we do not know until later. About the only certain thing is the uncertainty of it.

It may be that private manufacturers have found profit in the business of manufacturing armor plate. If they did not make money their business would surely come to an end, and their always up-to-date equipment would no more be at the command of the government upon emergency. In buying armor plate, the government has also maintained the most efficient means of producing armor plate, and as completely as if it could boast absolute ownership, with the added presumption of vastly greater efficiency. As to the prices paid for armor plate, it cannot be lost sight of that the product is as distinctly a specialty as is the production of telescope lenses, and calls for vastly more costly equipment. The market price of glass has little to do with the cost of the finished disk, and the cost of nails and horse-shoes has as little relation to that of turret walls.

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A Steam Motor Car versus the Electric Motor.

It is possible that the advent of the combination car described in "Locomotive Engineering" for November is an event in railroad history. It seems to be a sensible and practical means of meeting the encroachments of the electric roads in local and short-trip business. The car was built at the Schenectady Locomotive Works for the New England Railroad. It is a steam motor car. A vertical boiler carrying 200 pounds of steam is mounted over the center of the truck at one end, and only the one truck is used for driving. The boiler is surrounded by a circular casting on which is a groove in which rest 125 1¼ hardened steel balls. A corresponding casting attached to the framing of the car rests upon these balls, allowing the locomotive truck to swivel freely in passing curves. The cylinders are 12 x 16 inches, and the driving wheels 42 inches diameter. The maximum tractive power is 9,000 pounds. The Walschaert valve gear is used. Water is carried in long tanks under the body of the car. The fuel used is coke or anthracite, and the car runs sixty miles without replenishing. The car seats sixty passengers, and is operated by two men. Trials of it have proved highly satisfactory.

Personal.

Chief Engineer William W. Dungan, U. S. N., will be retired from December 22d.

Chief Engineer H. Webster, U. S. N., is detached from the Yorktown and ordered home. He has two months' leave.

Chief Engineer G. J. Burnap, U. S. N., has been detached from the New York on relief and ordered to Cramp's shipyard.

Passed Assistant Engineer J. K. Robison, U. S. N., is detached from the Yorktown and ordered home. He has two months' leave.

Passed Assistant Engineer E. H. Scribner, U. S. N., is detached from the Yorktown and ordered home. He has two months' leave of absence.

Mr. J. W. Carrel, formerly with the Davis & Egan Machine Tool Company, has accepted a position as salesman with Messrs Dawson & Goodwin, of Chicago.

Chief Engineer C. J. MacConnell, U. S. N., has been detached from the Lancaster, on her arrival at Boston, and ordered to the New York as Fleet Engineer.

We will consider it as a favor if our readers will send in items of news regarding changes of foremen, superintendents or others prominently connected with the machine business. Such items are legitimate news of the trade, and we are glad to make room for them.

Mr. Joseph K. Long, general foreman of the Western & Pennsylvania Railway Company's blacksmith shop, at Buffalo, N. Y., has tendered his resignation, taking effect November 16th, and will return to the Pennsylvania Railroad Company to take a more lucrative position.

Mr. H. A. Bergstram called at this office a few days ago on his way to Ponce, Porto Rico, where he goes to set up a 300-horse power, cross-compound, Corliss engine, which is to be used in an electric lighting plant at that place, the contractors for which are the General Electric Co.

Mr. Albert S. Smith, of the Cincinnati firm of Smith & Mills, returned on the 16th inst. from a visit to Europe in the interests of his firm, which builds shapers exclusively. Mr. Smith reports a good business and, so far as he could see, good prospects for a continuance of business abroad.

Mr. August C. Christensen, who until recently was chief engineer and superintendent of the Geo. F. Blake Manufacturing Company, and was formerly connected with Henry R. Worthington, has opened an office at 120 Liberty street, New York, where he will do business as a consulting and contracting engineer.

Mr. E. B. Hotchkiss, assistant superintendent and mechanical engineer of the Duquesne Manufacturing Company, of Pittsburg, during the season 1897, will sail for Belgium to assume supervision of the bicycle plant of H. Pieper, at Liege. The machinery for this plant is being supplied by the Pratt & Whitney Co., of Hartford, Conn.

Mr. R. C. Fay, formerly superintendent of the Remington Arms Company, of Ilion, N. Y., and who was engaged last year by the Thomas Manufacturing Company, of Springfield, O., as manager of their bicycle department, has returned to the East, having been engaged as superintendent by the Mossberg & Granville Manufacturing Company, of Providence, R. I.

Mr. George H. Olney who for 22 years has been connected with the machinery business in New York city—the past 11 years with James Beggs & Co.—has formed a partnership with Mr. Ernest Warren, the firm to be known by the name of Olney & Warren, which firm will build model locomotives and special machinery and will deal in engines, boilers, machine tools and supplies at 36 Dey street, N. Y.

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Arm Torn off by a Belt.

On November 20th, in this city, Stephen Bordero, nineteen years old, in putting on a grindstone belt had his arm caught and entirely torn out. It was thought that he could not live.

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The Cramps have contracted to build four steel screw steamers for the Boston Fruit Company. These steamers are intended for the West India trade, will be about 290 feet long, 36 feet beam and with a dead weight capacity of about 2,500 tons. They are to be 15-knot vessels and will have acommodations for 100 passengers. They will have all the latest appliances and improvements.

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Users of leather belting will, it seems, soon have to pay an advance of about 25 per cent. in prices; a resolution to make such an advance having been adopted by the Leather Belting Manufacturers' Association, which held its annual meeting in this city recently. The resolution making this advance cites the import duty placed upon hides by the Dingley bill as the cause of the action taken.

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Commercial Review.

New York, Saturday Evening, Nov. 20

WOOD-WORKING MACHINERY.

The market, to judge from offices in this city, exhibits a fair, though moderate trade. The yellow fever in the South is, of course, a circumstance greatly affecting it in that region, but the suspension is not total. "We keep a man still traveling there, and he has managed to get through the quarantines," remarks the New York chief of one of the largest wood-working machinery interests in the country. Still, the South is an important field in this branch of trade, and some other companies are not pretending to do much there while the fever lasts.

As an actual instance of Southern business, may be mentioned certain orders being received by the Berlin Machine Works for fitting up the new car shop of the Georgia Central Railroad, that are to replace those which burned down.

About as good a field for orders as any, at present, seems to be Western New York and Pennsylvania, where trade is said to be better than in New England.

In a conversation with a representative of the wood-working machinery market, he commented to us, in very emphatic terms, upon the change which is taking place in the location of wood-working enterprises. In the New York district, relatively less and less of this work seems to be carried on, and dressed lumber is brought in from the West and from the Southern pine districts. Settlements in the latter regions, for instance, where formerly there was merely a saw-mill, now have drying-kiln, etc. So that, because there is less demand for wood-working machinery in New York than formerly, there may be all the more elsewhere.

"Most of this season's orders have already been placed," remarks the gentleman above referred to, who is connected with one of the largest of the companies, "but inquiries are good, and we look forward to an active spring. Business seems generally to be improving."

The consolidation of manufacturers of wood-working machinery has not yet been perfected, and from the tone of reports now current, such culmination appears rather dubious. There is talk of important change in the personnel of the inchoate enterprise. It is said that a certain Western multi-millionaire, well known by name in connection with a manufacturing company in another line, and who was expected to furnish capital for the new combination, has shown hesitancy in so doing, and that the Berlin Machine Works, Beloit, Wis., which has not hitherto been included, is now considering favorably the proposition to enter, with the understanding that it shall have practically a controlling interest. This report would seem to place the J. A. Fay & Egan Company, which has hitherto taken the lead, in the background or outside of the enterprise; but we do not consider ourselves justified in asserting definitely that they have retired in any way. According to another report, the trust held a meeting recently, and is likely to take effect shortly.

EXPORTS OF WOOD-WORKING MACHINERY.

As to the trend of the foreign market this month, experiences vary.

Six large pieces of wood-working tools, valued at $16,000, for use in a furniture factory have been ordered through a Wall

street banking house by merchants in Havre, France. It is said that some Japanese merchants are soon to arrive in this country for the purpose of buying a wood-working plant and a steam plant for running the same.

The H. B. Smith Machine Company's export department reports improvement in trade with certain countries. It is pretty good in Europe and some Spanish-American lands where revolutions are not in progress. They have made good sales recently to England, France and the West Indies. The classes of wood-working machinery in demand from them include moulding machines, band saws, single and double shapers, planers, etc.

A "FLOATING EXPOSITION."

The president of a certain engineering company who has been making foreign trade the subject of special investigation, informs us that quite an important change is taking place in the methods requisite to success therein. He came near telling us what the new ideas were, but upon second thought concluded that, as the rank and file of manufacturers had not yet caught on to it, it would be more prudent to let his competitors find it out for themselves; nor can we blame him very much for taking that stand. There is, however, one new scheme in export extension which may just possibly have been the one referred to, and which we are able to mention. It is that of chartering a steamer as a floating sample warehouse for the South and Central American markets. Each manufacturer's agent taking passage is allowed to carry 3,300 pounds of samples, and the wares will include sugar and mining machinery, small engines, etc. The refrigerating and lighting plants used on board will be part of the exhibits. For the purpose, Captain A. L. Lowe has proposed to charter the steamer Knickerbocker, of the Cromwell line, and hopes to start early in January.

ENGINE GOSSIP.

A bug-bear in the eyes of the steam-engine builder is the gas engine. One party tells us of having lost a contract for a fine isolated lighting plant, to be installed in the residence of a well-known millionaire, because the gas-engine people intervened and got the job. He mentions also that a hotel uptown has become afflicted with the gas-engine craze, and has installed two brought over from England. When they put them in and started one, she stopped and acted like a balky horse. Our informant maintains that the English construction is crude and rough, and that our engines beat theirs in workmanship by 25 per cent. But this gas engine at least possessed the merit of perfect regulation.

Some of the engine companies seem to be taking up the gas-engine business. We ran across one of them not long ago who were investigating the subject with that end possibly in view.

The fact that some of the large engine builders are able and willing to maintain conservative prices accounts for the fact that their local agents do not receive orders very often.

SUNDRY NOTES.

We hear of the proposed importation from England of a boiler to be used in a boat to navigate upon Lake George, which is to carry 225 to 250 pounds pressure, and, with an engine built in this country —the Forbes—give the boat perhaps the highest speed of any of the type afloat.

The following is perhaps a result, in the engine market, of the good foreign demand for wheat within the past year. A floating grain elevator of the International Elevator Company, is now building at Camden, N. J., for this port, and a contract has been let for two Buckeye engines to be installed therein.

The Clayton Air Compressor Works, Brooklyn, N. Y., report that their volume of sales for the month of October is larger than for any preceding month in the history of the business, and three times greater than their average sales for five years past. They give a list of important orders in hand.

The Bignall & Keeler Mfg. Co., Edwardsville, Ill., report a gratifying demand for their pipe threading and cutting machines. Among a list of their very recent sales furnished us, we notice an order from the United States Government for machinery to be used upon new Mississippi dredge boats.

The General Electric Company during the months of June, July and August received orders for 278 generators, aggregating nearly 14,000 kilowatts for lighting purposes alone.

A representative of the "American Machinist" who passed through New Eng-

(*Continued on page 35.*)

Business Specials.

Gear wheels, gear cutting. Grant; see page 16.

Forming Lathes. Mer. Mach. Tool Co., Meriden, Ct.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. The Cash and Copy should be sent to reach us not later than Saturday Morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Situations Wanted.

M'ch eng., 2 yrs exp., pos as dft'n. Box 75, Am Mach.

General machinist wants situation; capable and energetic Box 94, American Machinist.

Position Wanted—By sober, industrious tool mkr; macht. 17 years exp.; best ref. Box 97. Am. Mach.

Wanted—Situation by a general machinist; planer and boring mill a specialty. Box 95, Amer. Mach.

Mech. eng., graduated in Germany, age 26, wants position; spec. and gen. mchy. Box 81, Am. Mach.

Mechanic desires to assist inventor in working out mechl problems; draftsman, pattern maker and machinist; refs. Address Box 96, Amer. Mach.

By practical machinist and draftsman, position as foreman or supt. of machine shop; exp. on engines, pumps, air compressors, etc. Box 92, Amer. Mach.

Mechanical engineer, with extensive experience as superintendent and manager of large machine works, is open to engagement. Stationary and marine engines, boilers, foundry work, gearing and general machinery. Can manage shops, engineering department, estimate or solicit. Best of references. Address Box 82, American Machinist.

Help Wanted.

Wanted—Foreman for shop tapping iron pipe fittings, valves, etc.; must be good mechanic and capable of handling men; refs. Box 67, Am. Mach.

Wanted—Foreman for machine shop; one that has had experience on marine work preferred. State age and salary expected. Address Phoenix Iron Works, Port Huron, Mich.

Wanted—In England, a first-class draftsman, used to light machine tools; good job for the right party; reply, stating age, experience and salary, Alfred Herbert, Ltd., Coventry.

Wanted—Foreman for foundry employing from 40 to 60 men; must be capable of making his own mixture and handling men to the best of advantage. Address Box 93. American Machinist.

Wanted—A mechanical draftsman, one familiar with designing rolling mill machinery preferred; must be quick and accurate. State age, experience and salary wanted. Address box 852, Reading, Pa.

We want steady, industrious and ambitious foreman for our new mch shop. Work mostly repairs. Must be capable of soliciting work and making estimates. Dickson Car Wheel Co., Houston, Texas.

Wanted—A first-class salesman who is thoroughly familiar with punching presses and rolling mills; first-class refs. Send photo. with particulars to Mossberg & Granville Mfg. Co., Providence, R. I.

Wanted—A salesman having a good trade among factories, machine shops and engineers in N. Y. City and vicinity. Only those having established trade need apply. Communications strictly confidential and a good paying position is open to the right man. Box 84, American Machinist.

The Automatic Machinery Co., of Coventry, England, makers of balls, nuts, bearings., etc., require thoroughly competent works director; must be mechanic capable of running present automatic plant and directing construction of additional machine tools—on the spot as occasion arises; present mechanical manager retiring. The business of the company is well established and profitable, and a direct interest would be offered right man. Apply as above with references or testimonials.

Miscellaneous Wants.

Advertisements will be inserted under this head at 30 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Cheap 2d h'd lathes & planers. S. M. York, Clev'd, O.

Calipers & Gauges. F. A. Welles, Milwaukee, Wis.

Dies & Die Mak'g, $1. J. L. Lucas, Providence, R. I.

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Best and cheapest Bolt Header, made by Bush & Harris Machine Tool Co., Springfield, Mass.

Machinery to order, inventions developed. Leland, 469 Van Buren Street, Brooklyn, N. Y.

Light and fine mach'y to order; models and electrical work specialty. E. O. Chase, Newark, N. J.

For Sale—Second-hand drill presses, engine lathes & planers. Dietz, Schumacher & Boye, Cincinnati, O.

We make a specialty of Shartle's patent safety set collars. Prices low and samples free. Middletown Machine Co., Middletown, Ohio.

Wanted—To manufr. for respons. parties sheet metal stampgs., ptns., models, dies for metal, leather, cloth or paper. Bell Elec. Co., 46 E. 14th St., New York.

Machine and blacksmith outfit, complete, $1,200; 7, 8, 9 inch side and centre D. engines, one or 100, at $25 to $50 each. Logan, Machinery and Storage, Box 42, Oil City, Pa.

Wanted—By responsible firm, the New York agency for a first class gas engine. Have best of facilities and large acquaintance in this section. Box 83. American Machinist.

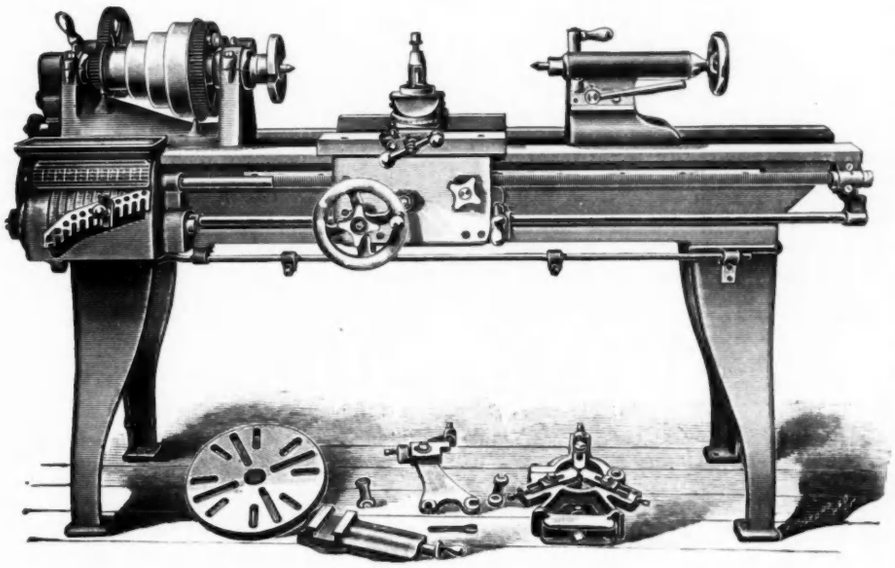
Lathes, planers, drills, milling machines, vises, also brass working machinery second-hand; must be modern and in first-class condition. C. C. Wormer Machinery Co., Detroit, Mich.

Wanted—Agency for N. Y. City for full line of steam engines and boilers by responsible house. Have fine store for showing goods and practical men at the head of it. Address Box 85. Am. Mach.

Small Manufacturers Wanted—The business men's association of one of best cities in middle West solicits correspondence with parties seeking new location for mfg. enterprises. "Business," Am. Mach.

For Sale—One engine lathe, 20" swing by 8' bed, G. A. Gray make, $170; 1 lathe, 14" swing by 6' bed, Lodge & Davis make, $100; 1 horizontal boring mill, bores from 4" to 20" cylinder, Barrett Vise & Tool Co. makers; 1 extra heavy vertical boring mill, has 3 separate cutter bars, each has independent automatic feed, weight 15,000 pounds, price $600. Box 91, American Machinist.

THIS LATHE COMBINES THE LATEST AND BEST IMPROVEMENTS.



14 in. x 6 ft. Hendey-Norton Lathe

With Improved Automatic Stop.

• • •

AUTOMATIC STOP

It is durable, simple, indispensable. It will automatically stop the carriage in either direction. It is equally efficient whether feeding or thread-cutting, running up to a shoulder, boring to bottom of holes, or internal thread-cutting. No danger of spoiling either tool or work. It is a safeguard against accidents in either direction.

CARRIAGE

The carriage reverses in apron; no slamming of countershaft. There is no comparison between this lathe and the old style or common lathe.

THREADS

It has all threads in daily use with simple movement of lever.

FEEDS

Has all feeds in daily use with simple movement of lever. Send for Circular.

• • •

THE HENDEY MACHINE COMPANY,

Torrington, Conn.

Agents for the Pacific Coast, PACIFIC TOOL AND SUPPLY CO., San Francisco, Cal.

European Agents, SCHUCHARDT & SCHUTTE, Berlin, Vienna, Brussels, Stockholm.
CHAS. CHURCHILL & CO., Ltd., London and Birmingham, Eng.
ADPHE. JANSSENS, Paris, France.
EUGEN SOLLER, Basel, Switzerland.

(Continued from page 34.)

land recently noticed some difference in the activity of shops visited. One machine tool concern, of some importance, in Worcester, Mass., was very busy, quite largely on foreign orders. On the other hand it is reported that one of the principal works of that description in the East has reduced time of running from ten to nine hours as a result of the engineers' strike.

A press dispatch from London says that on November 24th a conference will be held between fourteen representatives of the engineers and fourteen from their employers. For the meanwhile a truce has been agreed upon.

Quotations.

NEW YORK, Monday, November 22.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 75 @ $12 00
No. 2 foundry, Northern	11 25 @ 11 50
No. 2 plain, Northern	10 75 @ 11 00
Gray forge, Northern	10 25 @ 10 50
No. 1 foundry, Southern	11 00 @ 11 25
No. 2 foundry, Southern	10 50 @ 10 75
No. 3 foundry, Southern	10 25 @ 10 50
No. 1 soft, Southern	11 00 @ 11 25
No. 2 soft, Southern	10 75 @ 11 00
Foundry forge, Southern	10 00 @ 10 25

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.05 @ 1.10c.; refined, 1.15 @ 1.20c. Store prices: Common, 1.25 @ 1.35c.; refined, 1.30 @ 1.50c.

Tool Steel—Ordinary sizes, standard quality, 6 @ 7c., with some grades perhaps a little less; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel — Ordinary brands, from store, in small lots, 1.50 @ 1.60c.

Cold Rolled Steel Shafting—Base sizes, from store in small lots, 2.40 @ 2.50c.

Copper—Carload lots, Lake Superior ingot, 10¾c.; electrolytic, 10½ @ 10⅝c.; casting copper, 10⅝ @ 10½c. for ordinary brands.

Pig Lead—Carload lots, 3.75 @ 3.80c., f. o. b., New York.

Pig Tin—For 5 and 10-ton lots, 13.80c., f. o. b.

Spelter — Carload lots, 4.00 @ 4.10c., New York delivery.

Antimony—About 7¾c. and upwards for Cookson's; 7⅝c. and up for Hallett's; 7c. and up for Japanese.

Lard Oil—A good commercial brand of prime city, ice pressed, is quoted at 38 @ 40c., wholesale; ordinary present make, 37 @ 38c.

▲ ▲ ▲

Manufactures.

At Weld, Me., Mr. Oscar Conant is to build a new mill.

The Central Railroad is to rebuild its shops at Macon, Ga.

John E. Rhoades has opened a machine shop at Pittsfield, Me.

The Brake Beam Company, of Waukegan, Ill., is to enlarge its plant.

The Union Carriage Company, of St. Louis, Mo., has been incorporated.

The Roanoke (Va.) Locomotive Works is to be removed to Elwood, Ind.

At Dover, Me., the Boston Excelsior Company is erecting a new mill.

At Covington, Ky., the Art Metal Relief Company has been organized.

The Jarecki Acid & Phosphate Company is to build a plant at Sandusky, O.

The Union Iron & Steel Company, Youngstown, O., is erecting a new mill.

The Pottstown (Pa.) Brewing Company will increase the capacity of its plant.

The Warrior Machine Works, Birmingham, Ala., expects to install machinery.

At Pottstown, Pa., an addition is to be made to the boiler works of Cotter Bros.

The Middlesboro (Ky.) Foundry & Machine Works have been destroyed by fire.

The Otis Falls Pulp Company are to erect a pulp mill at Peterson's Falls, Me.

The Darling Pump Company, at Williamsport, Pa., is erecting a new building.

The George Whitney Woolen Company, Enfield, N. H., is to install a new engine.

At Wyncote, Pa., William Webber contemplates the erection of a factory building.

At Elizabethtown, Tenn., the Tennessee Cotton Mill is in course of construction.

The Self-Governing Valve Engine Company, of Portsmouth, Va., will erect a plant shortly.

The Niles Tool Works, Hamilton, O., contemplates the erection of a new machine shop.

At Muskegon, Mich., Wollful Bros., of Morris, Ill., contemplate the erection of a tannery.

The Portage Iron Works, at Duncansville, Pa., is preparing to add a new steel wire nail mill.

Charles Teehner & Co.'s dye works, Philadelphia, Pa., are to have an addition made to them.

It is reported that the Carnegie Steel Company intends to erect a steel plant near Greensburg, Pa.

The Monarch Manufacturing Company, of Hartford, Conn., has decided to locate its plant at Middletown, Conn.

The United States Iron & Tin Plate Manufacturing Company, of Demmler, Pa., will enlarge and remodel its plant.

At Amesbury, Mass., Dudley J. Marson and Charles E. Stone are to engage in the manufacture of carriage machinery.

Alex. Smith & Son's Carpet Company, Yonkers, N. Y., are to erect two new buildings and place the necessary machinery.

It is expected that the Watt Mining Car & Wheel Company, Barnesville, O., will erect an addition to its plant at an early date.

A company has been formed at Moro, Ore., for the purpose of erecting a foundry and machine shop. Dr. I. M. Smith is treasurer.

The Empire Cotton Mills, of Columbus, Ga., are closed at present, owing to some improvements and additions being made to the plant.

The Iola Manufacturing Company, of Iola, Kan., is making improvements to its plant, among which is the addition of a new machine shop, 50 x 100 feet.

At Chicago, Ill., the Meter Control Company has been organized with a capital of $100,000. The incorporators are Homer L. Kraft, Ed. T. Wray and Donald M. Carter.

Extensive improvements to its present plant at Mingo Junction, O., are projected by the Ætna-Standard Iron & Steel Company, of Bridgeport, O. It is estimated that the proposed improvements will cost about $750,000.

The Elwood Manufacturing & Mining Company, of Elwood, Ind., has elected the following officers: W. R. Covert, of New York, president; J. H. Taylor, of New York, vice-president; C. C. Andrews, of St. Louis, Mo., secretary.

The Pennsylvania Match Company, of Philadelphia, Pa., has been chartered. The plant will be located at Spring Grove, Pa. The directors are G. H. Welkel, Philadelphia; W. D. Welkel, Merchantsville, N. J., and D. M. Hinkel, Williamsport, Pa.

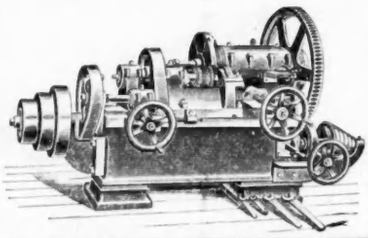
The Taylor-Morris Company, of Janesville, Wis., has filed articles of incorporation. The capital stock is $20,000. The incorporators are M. D. Taylor, R. H. Morris and G. Marsden. The company will manufacture engines, machinery, tools and brass castings.

The Brownley Manufacturing Company, of New York City, has been incorporated to make machinists' supplies. Capital, $50,000. Directors: William J. McQueen, of 319 East One Hundred and Forty-ninth street; Julius C. Drucklieb and John L. Thomas, of New York City.

The new boiler house which is being erected

(*Continued on page 37*)

CIRCULAR MILLING MACHINES



For milling the peripheries and edges of gears, pulleys, etc., in straight, angular and curved lines, and for other work of a similar character. Nos. 0 and 1 machines are arranged for external and internal milling. No. 3 for external milling only. Are very stiff and powerful, and do their work four times as fast as is done by lathes, and produce a smooth surface. Milling Cutters in all styles and sizes. GEAR CUTTING and SPINDLE DRILLING to order.

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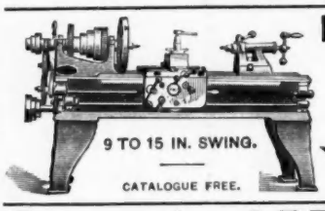

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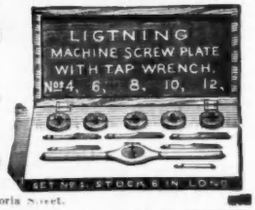

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5. Every Valve Tested before leaving the factory.
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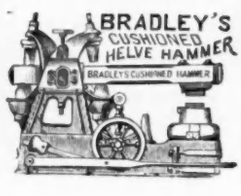

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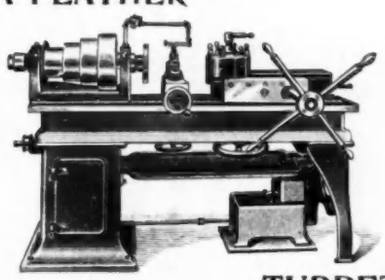

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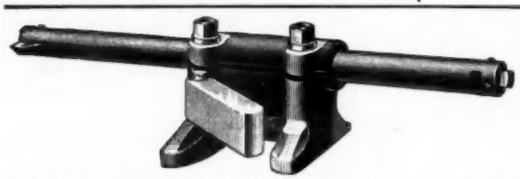

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Holders made of dropped forged steel.

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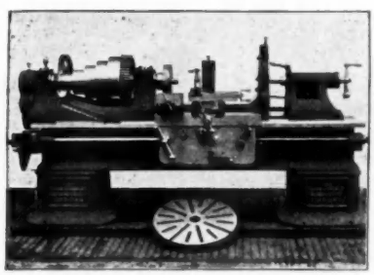

11 in. feeds 16 to 512.
14 in. treads 2 to 64.
16 in. feeds 4 to 128.
16 in. threads 2 to 64.
18 in. f eds 5 to 80.
18 in. threads 2 to 32.
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The Lodge & Shipley Machine Tool Co.,
CINCINNATI, O., U. S. A.

(Continued from page 30.)

by the Waterbury Buckle Company, of Waterbury, Conn., will have a roof of corrugated iron, supported on steel trusses. The building is 36 feet wide and about 48 feet long, having brick side walls. The steel work is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Conn.

The Davis & Egan Machine Tool Company has just shipped a carload of machine tools, consisting of hub machines, automatic screw machines, milling machines and other tools adapted to the manufacture of bicycles, to London, where they will be exhibited at the Crystal Palace Cycle Show at that place about the first of December. They are also making preparations to have a similar exhibit at the Berlin Cycle Show.

▲ ▲ ▲

New Catalogs.

There are three sizes of Standard Catalogs, first authorized by the Master Car Builders' Association, 9" x 12", 6" x 9" and 3½" x 6". We recommend the 6" x 9" size for machinery catalogs. When they must be larger or smaller, one of the other standard sizes should be adopted if possible.

Dean Bros., of Indianapolis, Ind., send us a catalog of air and vacuum pumps, condensers, cooling towers, etc. The catalog is 6 x 7¼ inches.

Wilson & Roake, New York, N. Y., send us a catalog of the "Sunbeam" house-heating steam and hot water boilers. The catalog is 5 x 7½ inches.

The Chattanooga Machinery Company, of Chattanooga, Tenn., sends us a catalog of machinery for making insulator pins, brackets, etc. The catalog is 6 x 8 inches.

We have received from the Bignall & Keeler Manufacturing Company, of St. Louis, Mo., catalog No. 13 of pipe threading and cutting machinery. The catalog is 4¼ x 6½ inches.

We have received from the Crosby Steam Gage & Valve Company a catalog describing various kinds of valves, gages, thermometers, etc. The catalog is bound in cloth, and contains 168 pages.

We have received catalog No. 3 of improved friction clutches of the Eastern Machinery Company, New Haven, Conn. A full description of the various parts of these clutches is given, and the catalog is 5¾ x 9 inches.

We have received from the Walker Company, Cleveland, O., a large-sized catalog, containing examples of some of the recently installed direct-connected power generators of this company. The catalog is 10 x 13¾ inches.

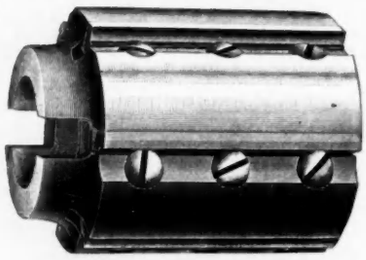
We have received from the Keystone Engine & Machine Works, Philadelphia, Pa., a catalog illustrating and describing steam separators, pumps, feed-water heaters and other steam power specialties. The catalog is 6 x 9¼ inches.

We have received from the Keystone Electric Company, Erie, Pa., a copy of their illustrated bulletin "C" on multipolar generators and motors. The various parts of these motors and generators are described very fully. The bulletin is 6 x 9 inches.

W. H. Nicholson & Co., Wilkesbarre, Pa., send us a catalog is which are described and illustrated expanding mandrels, capable of taking all sizes of holes from 1 to 7 inches. A number of testimonial letters are given, and the catalog is 6 x 9½ inches.

Perry Ransom, of Oshkosh, Wis., sends us Catalog D of grinding and polishing machinery, much of which is constructed to suit the needs of bicycle manufacture. A telegraph code used in ordering these goods is also given. The catalog is standard size, 6 x 9 inches.

We Make **Boring Machines, Milling Machines, Special Tools** Beaman & Smith PROVIDENCE, R. I.



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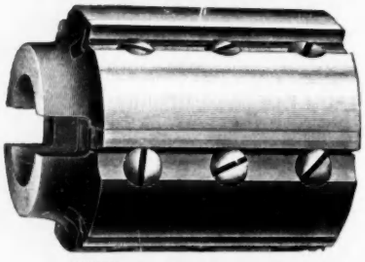

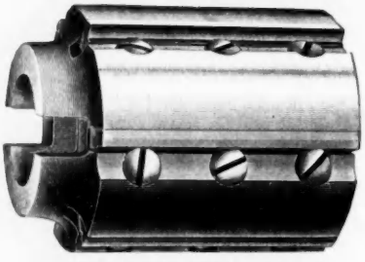
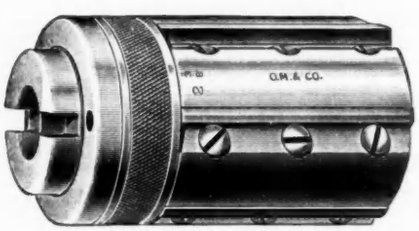

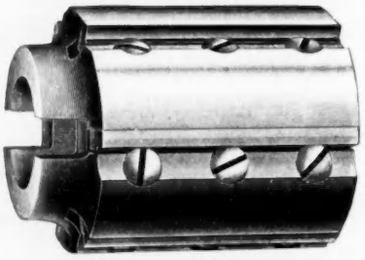

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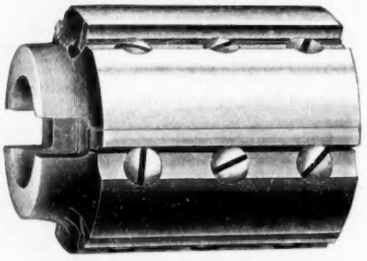
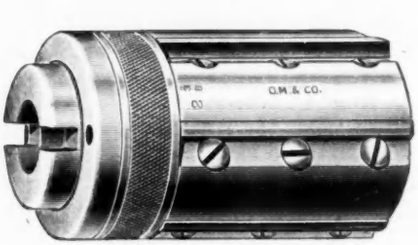

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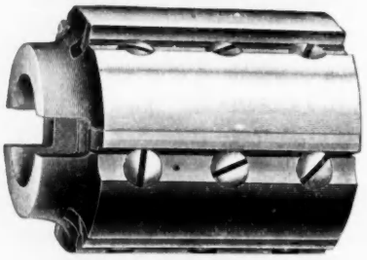
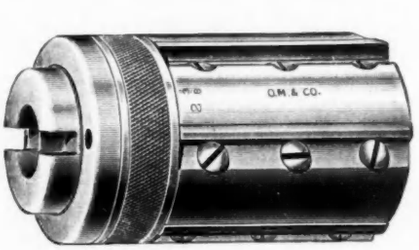

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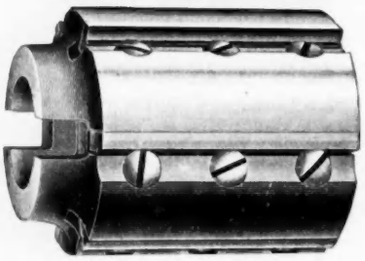
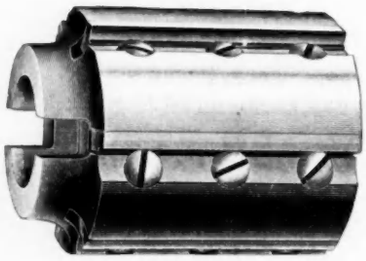

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13 in. x 6 ft. Sebastian.
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15 in. x 6 ft. Prentice Bros.
16 in. x 6 ft. Bogert, Taper.
16 in. x 6 ft. Fifield.
16 in. x 6 ft. Flather.
16 in. x 7 ft. Bridgeport.
16 in. x 7 ft. Pratt & Whitney.
16 in. x 18 ft. Bridgeport.
17 in. x 6 ft. Prentice Bros.
18 in. x 8 ft. Putnam.
18 in. x 12 ft. Putnam.
20 in. x 10 ft. Wright.
23 in. x 12 ft New Haven.
24 in. x 12 ft. Putnam.
24 in. x 8 ft. Fifield.
24 in. x 9 ft. Flather.
24 in. x 21 ft. Fifield.
26 in. x 10 ft. Fifield.
Pit Lathe, 50 in. face plate.

PLANERS.

13 in. crank, Lathe-Morse.
20 in. x 4 ft Matawan.
22 in. x 5 ft. Putnam.
24 in. x 5 1-2 ft. Putnam.
24 in. x 5 1-2 ft. Pond.
30 in. x 8 ft. Hewes & Phil.
30 in. x 10 ft Rochester.
32 in. x 8 ft. New Haven.
36 in. x 12 ft. Fitchburg.
48 in. x 16 ft. Putnam.

SHAPERS.

9 in. crank, Hewes & Phil.
14 in. crank, Gould & Eber.
24 in. friction, Hendey.

PRESSES.

No. 1 and 2, Stiles.
No. 19 and 20, Bliss.

MILLING MACHINES.

Hand feed, No. 1, Garvin.
Auto. feed, No. 0, Pratt-Whitney.
Auto. feed, No. 12, Garvin.
Lincoln pattern, Pratt-Whitney.
Vertical, large, Bliss.
Universal No 1, Brown Sharpe.
Universal No. 1, Kempsmith.

SCREW MACHINES.

No. 2, wire feed, Bardons-Oliver.
7-8 in. hole, plain, Jones & Lam.
1 9-16 in. hole, fric. head, P. & W.
2 1-16 in. Bicycle size.

DRILLS.

Friction disk, Barnes.
20 in. wheel and lever, Barnes.
20 in. wheel and lever, Prentice.
28 in. complete, Blaisdell.
28 in. complete, Aurora.
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RADIAL DRILLS.

72 in. swing, bk. gears, auto. fd.
100 in. swing, bk. gears, Niles.
110 in. swing bk. gears, Baush.
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20 in. Gap Punch and Shears.
Double P. & S., large, Long-Alls.
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Rolls, 6-8 and 14 ft.
Steam Riveter, 72 in. Bement.
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Cutting-off Machines, 2 and 3 in.
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Low Prices. Quick Sale. Condition Guaranteed as stated.

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13 in. x 6 ft. Sebastian, with chuck, A1 order.
14 in. x 6 ft. Wagner, new, a little shop worn.
16 in. x 8 ft. Perkins, with chuck, A1 order.
18 in. x 8 ft. Lodge, Barker & Co., A1 order.
24 in. x 12 ft. Porter, with taper att. and chuck, A1 order.
25 in. x 10 ft. Bradford Mill Co., A1 order.
28 in. x 12 2-3 ft. New Haven, new, a little shop worn.
60 x 15 ft. New Haven, new, a little shop worn.

PLANERS.

22 x 22 x 5 ft. New Haven, with chuck, good working order.
24 x 20 x 4 ft. New Haven, new, a little shop worn.
26 x 24 x 5 ft. New Haven, good as new.
28 x 24 x 5 ft. New Haven, new, a little shop worn.
28 x 24 x 7 ft. New Haven, new, a little shop worn.
42 x 36 x 10 ft. Pond, first-class order.

SHAPERS.

15 in. crank, McFarlan & Nottingham, good order.
15 in. geared Walcott, like new.
22 in. geared Walcott, power D. F., new, a little shop worn.
24 in. geared Steptoe, A1 order.
26 in. geared Steptoe, A1 order.

DRILLS.

10 in., 3 spindle, Dwight Slate, A1 order.
20 in., square base, W. & L. feed, Simpson, A1 order.
25 in. Barnes, back gear, power feed, A1 order.
28 in. Lodge & D M. T. Co., B. G., P. F., Q. R., like new.
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No. 4 Toledo, plain, like new, with dies for making medicine cases.
No. 125 Back Geared Ferracute Drawing Press, like new.

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No. 2 1-2A Curtis & Curtis, 1 1-2 to 4 in., R. & L., hand and power, A1 order.
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1 24 in. x 24 in. x 6 ft. Powell.
1 24 in. x 24 in. x 7 ft. L. & M.
1 26 in. x 26 in. x 9 ft. Gleason.
1 30 in. x 30 in. x 10 ft. Niles.
1 32 in. x 32 in. x 12 ft. Gray, with two heads.
1 36 in. x 36 in. x 12 ft. Powell, with two heads.
1 36 in. x 36 in. x 16 ft. Wm. Sellers.
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1 4-spindle, Hendey.
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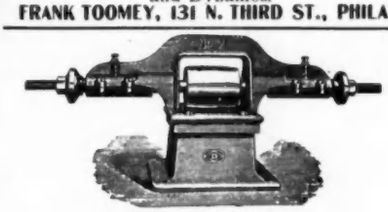

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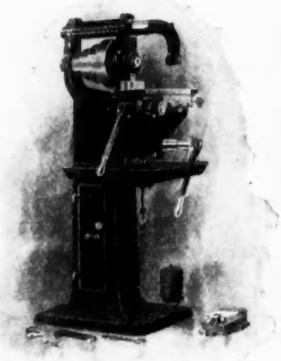

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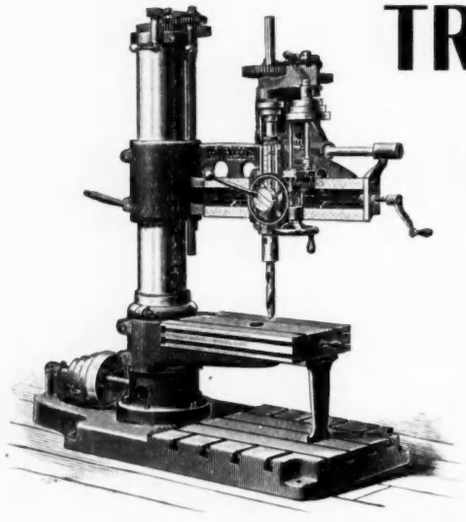

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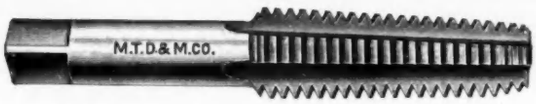

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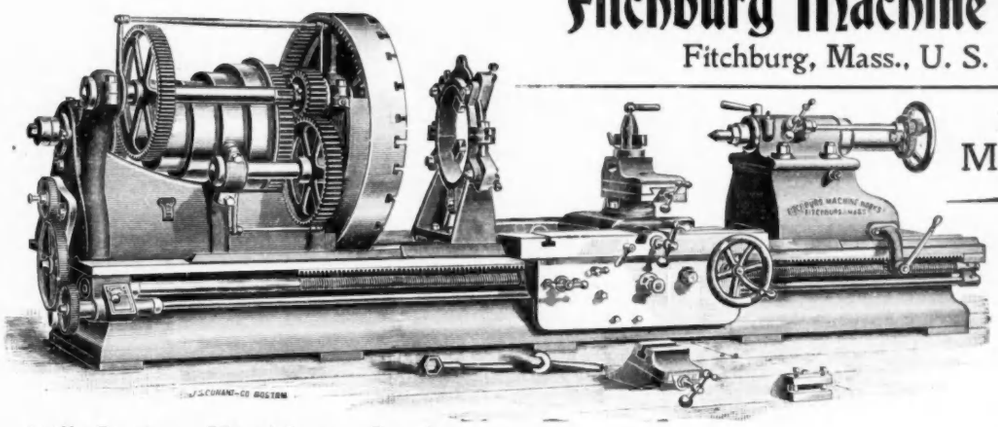

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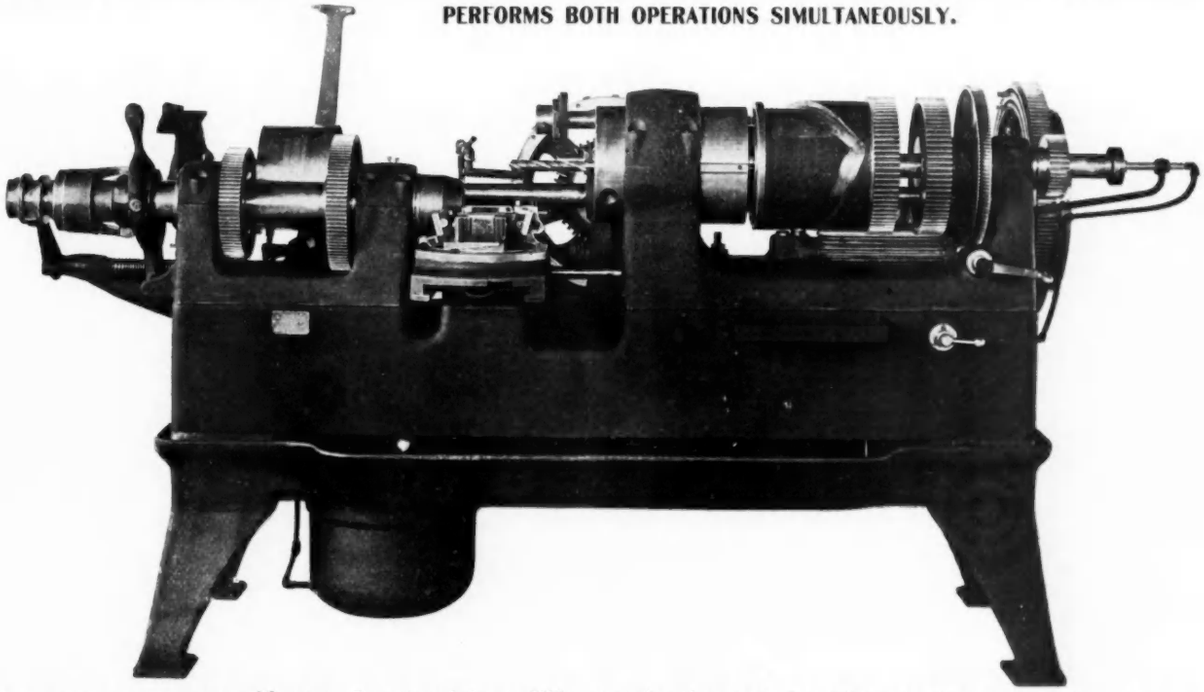

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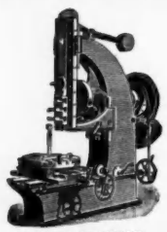

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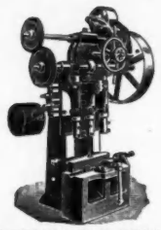

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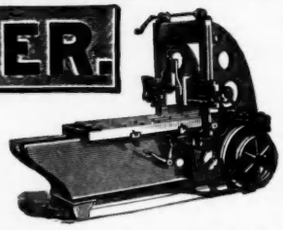

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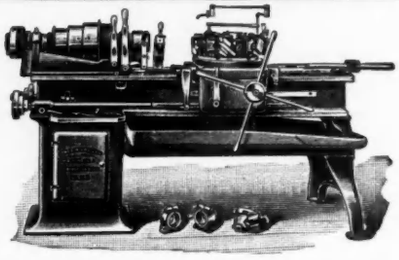

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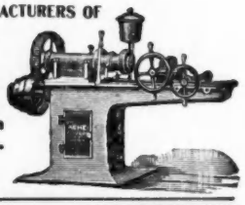

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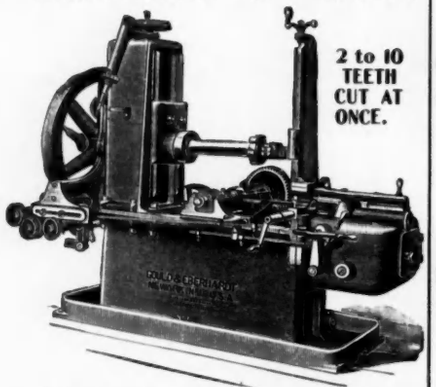

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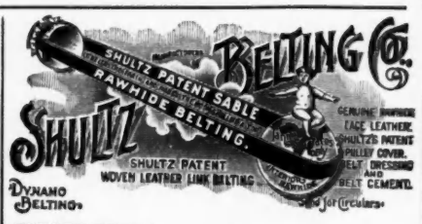

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